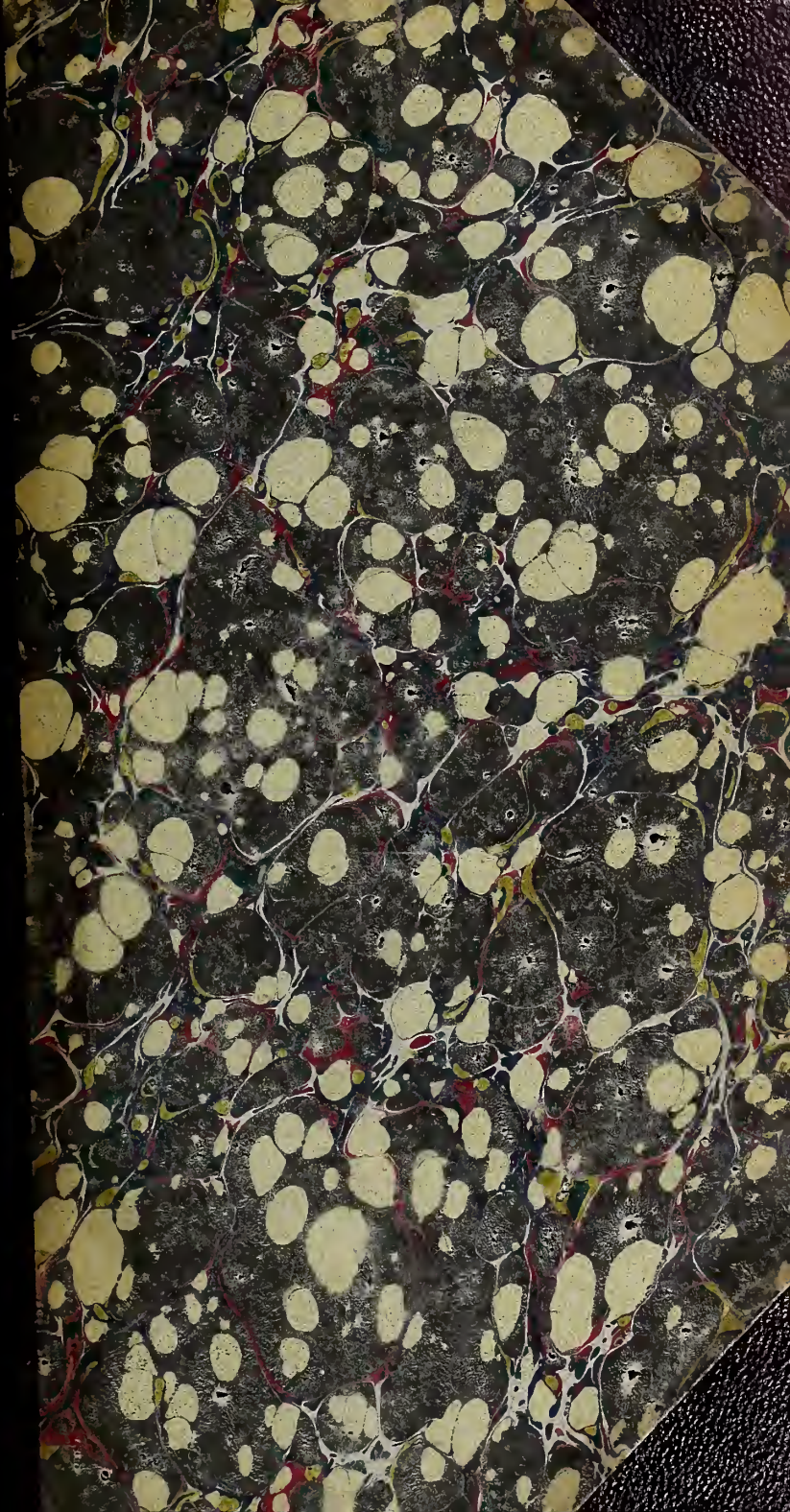

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JOURNAL

OF THE

ASIATIC SOCIETY.

No. V.—1855.

On the Epoch of the Gupta *Dynasty.—By* E. Thomas, *Esq., B. C. S.*

In the year 1848, I submitted to the Royal Asiatic Society of London, a Memoir on the Dynasty of the Sáh kings of Sauráshtra. The object I therein proposed to myself, was to test—through the medium of coins, inscriptions and written history—the definite epoch at which the rule of these Princes might most fitly be fixed. In approaching the more specific aim of my enquiry, I had necessarily to examine the dates seemingly most appropriate to certain other races of kings, whose history bore directly or indirectly on the subject under review.

Prominent among these was the family of the Guptas, whose monumental records are extant from the Northward of the Ganges to Guzrát, and whose coins alike indicate a well sustained supremacy, spreading from the Himálayas to the Western coast.

Of the various works put under contribution to elucidate my theme, the most valuable, perhaps, was the "Fragmens Arabes et Persans relatifs a l'Inde" then but newly published by M. Reinaud.

This volume supplied me with several interesting extracts from the original Arabic MS. of Abú Rihán Al Birúní, an author, who had visited India during the reign of Mahmúd of Ghazni. One of the deductions I arrived at on the testimony of the Arabic text was, that the rule of the Guptas, preceded that of the Valabhis—the era of the latter dating from 319 A. D.

This position has been contested by Major A. Cunningham in his book on "the Bhilsa Topes." Now, as the Gupta era, forms a highly important time-mark in the general scheme of Indian history, I may, I think, fairly claim a hearing while examining the question somewhat in detail.

It is a frequent and often deserved reproach against the more determined of the class "Antiquary," that the tendency of such researches is to enlarge the faculty of ingenuity at the expence of comprehensive intelligence. Seldom has been seen a more apt illustration of the justice of this popular accusation, than is afforded in the work just cited. My critic, after a very elaborate collation of minute coincidences—most of them more seeming than real—and an accumulation of a mass of materials, he imagines to be suitable for his purpose—succeeds in raising up a most imposing superstructure, the single fault of which consists in its foundations resting on the veriest sand. Neither can I compliment Major Cunningham on the candour with which he has conducted his cause; he states the bare conclusions I have come to, but usually abstains from informing his readers of the grounds whereon I base my inferences, while his own arguments are paraded in all their exparte advantage.

I must premise, before I proceed to test the value of the criticisms passed on one of my earliest essays, that I neither then was, nor am I now wedded to any particular theory, I should have sincerely rejoiced, if, out of my errors, the truth could have been developed; my speculations—avowedly conjectural in themselves—were put forward with sufficient humility, and therefore I should not consider myself in any way compromised by the subsequent enunciation of any more plausible theory—but, having been attacked, I feel bound to justify myself—with what success it will be for others to decide.

Major Cunningham* opens his argument by objecting to the authority I quote; he first impugns the validity of the statement in

* I reprint almost entire Major Cunningham's case against me, arranging it in detached portions, with a view to bring its various headings, as nearly as may be, into juxta-position with the opening portions of my replies. I commence my quotations at Ch. XII. par. 1, page 138.

the original text of Al Birúní, and then proceeds to the somewhat bold expedient of proposing a translation, that is to supersede that of M. Reinaud, the Professor of Arabic in the Oriental College of Paris! The latter I shall leave to defend himself, but it is necessary for me to state at once, that *the* amended version is pronounced erroneous by all the Arabic scholars, European and Native to whom I have submitted the passage in question.* But the most unaccount-

"Ahu Rihán who in his account of Indian eras, identifies the GUPTA KÁL, or Gupta era, with the BALLABA KÁL, or era of *Balabhi*, which commenced in A. D. 319. These eras are mentioned no less than three times by Ahu Rihán; and each time he has identified them as starting from the same date. But it appears to me that the most important of these passages must either he corrupt or obscure, for the translation given by M. Reinaud makes the epoch of the Guptas commence from the date of their extermination! If this is a correct translation, there can he little doubt that the text of Abu Rihán must be erroneous; for we know positively that the Guptas were reigning during the fifth and sixth centuries of our era. But I will venture to suggest a different translation of this important passage, by which the error is got rid of, without any alteration of the text:—[here follows the Arabic text introduced with M. Reinaud's French Translation, page 332]. "With regard to the *Gupta kál* (or era of the Guptas) the name was that of a wicked and powerful family; *whose epoch became extinct with themselves;* and truly Ballaba was after them; for the beginning of their era is the same as (that of) the last (namely) 241 of the SÁKA KÁL."

The underlined passage in the original text is thus translated hy M. Reinaud: "et l'ère qui porte leur nom est l'èpoque de leur extermination;" but the literal translation appears to be, "and then became extinct along with their epoch," which agrees with the version that I have given ahove.

The statement made in M. Reinaud's version is so extraordinary that, even without any direct proofs of its inaccuracy, I would have set it aside as erroneous. The era of the Seleukidæ *began* with the foundation of the Syrian empire by Seleukos; the Christian era is dated from the *establishment* of Christianity; and the era of the Guptas without doubt commenced with the *settlement* of their own dynasty. For the Guptas, as I have mentioned before, date their inscriptions in an era of their own; which, though not so named by them, was actually a *Gupta kál*, and must, therefore, have been called such by the people.—Bhilsa Topes, p. 140.

* In order to put my readers in possession of the statements of Al Birúní in all their integrity, I append the French Translation of all that refers to the Gupta era, inserting likewise the original Arahic of the disputed passage.

"On emploie ordinairement les ères de Sri-Harscha, de Vikramaditya, de Saca, de Ballaba et des Gouptas. * * L'ére de Saca, nommée par les Indiens Saca-

able portion of the ratiocination advocated by Major Cunningham is that even taking his improved reading, he, in effect, concedes to me all I demand; I assumed from the original passage, that the

kâla, est postérieure à celle de Vikramaditya de 135 ans. Saca est le nom d' un prince qui a régné sur les contrées situées entre l' Indus et la mer. Sa résidence était placée au centre de l'empire, dans la contrée nommée Aryavartha * * Vikramaditya marcha contre lui, mit son armée en déroute et le tua * * Cette époque devint célèbre, à cause de la joie que leu peuples ressentirent de la mort de Saca, et on la choisit pour ère, principalement chez les astronomes.

Ballaba, qui a donné aussi son nom à une ère, était prince de la ville de Ballaba, au midi de Anhalouara, à environ trente yodjanas de distance. L'ère de Ballaba est postérieure à celle de Saca de 241 ans. Pour s'en servir, on pose l'ère de Saca et l'on en ôte à la fois le cube de 6 (216) et le carré de 5, (25). Ce qui reste est l'ère de Ballaba. Il sera question de cette ère eu son lieu."

Before continuing the French translation, I insert the Arabic text of the disputed passage.

واما تاريخ بلب و هو صاحب مدينه بلبه و هي جنوبية عن مدينة انهلواره بقريب من ثلثين جوزن فان اوله متاخر عن تاريخ شق بمائتى واحدى واربعين سنة و مستعملوه يضعون شككال وينقصون منه مجموع مكعب الستة و مربع الخمسة فبقى تاريخ بلب و خبره آت في موضعه و اما كوبت كال فكان كما قيل قوما اشرارا اقوياء فلما انقرضوا ارخ بهم و كان اخيرهم فان اول تاريخهم ايضا متاخر عن شككال ٢٩١

M. Reinaud's rendering is as follows:—

" Quant au Goupta kàla (ère des Gouptas), ou entend par le mot *goupta* des gens qui, dit-on, étaient méchants et puissants; et l'ère qui porte leur nom est l'époque de leur extermination. Apparemment, Ballaba suivit immédiatement les Gouptas; car l'ère des Gouptas commence aussi l'an 241 de l'ère de Saca. * * D'après cela, en s'en tenant à l'an 400 de l'ère de Zezderdjed, on se trouve sous l'année 1488 de l'ère de Sri-Harscha, l'an 1088 de l'ère de Vikramaditya, l'an 953 de l'ère de Saca, l'au 712 de l' ère de Ballaba et celle des Gouptas. * *

Déjà je me suis excusé sur l'imperfection de ce qui est dit ici, et j'ai averti que les résultats que je présente offraient quelque incertitude, vu les nombres qui excèdent celui de cent. Je ferai remarquer de plus que j'ai vu les Indiens, lorsqu'ils veulent marquer l'année de la prise de Soumenat (par Mahmoud le Ghaznévide), événement qui eut lieu l'an 416 de l'hégire (Janvier 1026 de J. C.), et l'an 947 de

Valabhi era commenced in 319 A. D. and that "the Gupta rule preceded it." [J. R. A. S. xii. 4.]

The amended translation contains these words "*and truly Ballaba was after them,*" [the Guptas]. What greater support does my argument require than the admission I have italicised? And yet, will it be credited?—on the strength of a sentence admitted to contain the substance of these words, it is unintentionally, but in effect—attempted to establish that the Guptas and the Valabhis were contemporaneous.

Major Cunningham next enters upon certain remarks about eras in general—designing to show that all eras necessarily begin with the rise and not with the fall of a race! and therefore that the era of the Guptas "commenced with the settlement of their own Dynasty." It is a pity, for the consistency of this view, that regard was not had to the era of Yesdegird, which might well have been brought to the writer's notice in the very pages of Al Birúní himself, or that, when speaking of Valabhi eras, it was not borne in mind, that the *first* Mahárája of that race did not initiate the family cycle.* But to let this pass, in whatever era the Guptas may date their inscriptions, I should still claim to place the period embraced in all its integrity and completeness before A. D. 319.

Major Cunningham after assuming the employment of a *Special* Gupta Kál goes on to apply it in its details, by constructing a chro-

l'ère de Saca, je les ai vus écrire 242, puis au-dessous 606, puis encore an-dessous 99, enfin additionner le tout ensemble; ce qui donne l'ére de Saca. Ou peut induire de là que le nombre 242 indique les années qui précèdent l'époque où les Indiens commencèrent à se servir d'un cycle de cent, et que cet usage commença avec l'ère des Gouptas. D'après cela, le nombre 606 indiquerait les samvatsaras de cent complets, ce qui porterait chaque samvatsara à 101. Quant au nombre 99, ce seraient les années qui se sont écoulées du samvatsara non encore révolu. C'est ce qui est en effet. J'ai trouvé la confirmation et l'éclaircissement de cela dans les tables astronomiques de Durlab le moultanien; ou y lit: E'cris 848 et ajoute le Loka-kâla, c'est-à-dire le comput du vulgaire; le produit marquera l'année de l'ère de Saca." En effet, si nous écirvons l'année de l'ère de Saca qui correspond à l'année actuelle, et qui est l'année 953, et que nous retranchions de ce nombre la quantité 848, il restera 105 pour le Loka-kâla, et l'année de la ruine de Soumenat tombera sur le nombre 98.

* Wathen, J. A. S. B. IV. 481.

nological list of the entire succession. In this he places *Srí Gupta* under Anno Gupta—thereby, in effect, making this individual the prominent founder of the Royal race of Guptas, a position scarcely in accord with the terms in which this person is spoken of in the family records on the Allahabad and Bhitárí columns,* or altogether in unison with the modest titles assumed by himself and his immediate successor.† The dynastic inscriptions concede but scant honor to these members of the race and only elevate Chandra Gupta 1st to the dignity of *Mahárájadhirája.*

I now approach the arguments mainly relied on, which are thus urged against me. "The direct evidence of the period when the Guptas flourished is derived from the Chinese. In A. D. 428, the king of Kapila, was named YUE-GAI or *moon-beloved* which is a synonyme of CHANDRA GUPTA, or *moon-cherished.*"‡ I am disposed to

* The Rev. W. H. Mill in commenting on the Allahabad Column Inscription, expresses himself as follows. * * But the inscription gives us the *names* also of the prince and his immediate progenitors: and in accordance with the above-mentioned account, while we find his * * * ancestors, his grandfather and great-grandfather designated only by the honorific epithet *Mahárája*, which would characterize their royal descent and rights—the king himself (SAMUDRA GUPTA) and his father are distinguished by the title of *Mahárája Adhirája*, which indicates actual sovereignty. And the last mentioned circumstance might lead some to conjecture, that the restoration of royalty in the house began with the father named Chandra Gupta. J. A. S. B. III. p. 266 [see also Bhitárí Lát Inscription, J. A. S., B. VI. p. 6, and Revised Allahabad Inscription, VI. 969.

† Prinsep, [J. A. S., B. V. 645], speaking of a coin of GHATOT KACHA, observes in regard to the style of legend adopted by these sovereigns; "to whom, whether from their extra-Indian, or their low origin, or their limited sway, the panegyrist seems to have avoided applying the usual epithets of royalty, *Mahárájadhirája.*"

‡ "Para 3. The direct evidence of the period when the Guptas flourished is derived from the Chinese. In A. D. 428 the king of Kapila was named *Yue gai*, or 'moon-beloved,' which is a synonyme of *Chandra Gupta* or 'moon-cherished.' "

In A. D. 502, the king of India was named *Keu-to* that is *Gutto*, the Páli form of the Sanskrit *Gupta.*

Lastly, Hwán-Thsáng (*Fo-kue-ki*, Appendix) names five princes of Magadha, who flourished previous to the conquest of the country by Síladitya, in the following order:—Lo-kia-lo a-yi-to or *Lagraditya*, Fo-tho-kiu-to or *Buddha Gupta*, Tha-ka-ta-kiu-to or *Tukta Gupta*, Pho-lo-a-yi-to or *Baladitya*, Fa-che-lo or *Vajra*.

attach no value whatever to this evidence. The statement referred to runs to the following effect—the kingdom of Kapila is mentioned by *Ma-twan-lin* under the name of *Ka pi li.*—In the article India,

4. Now Síladitya died between 642 and 648 (say in 645) and as he reigned sixty years, his accession must have taken place in A. D. 585; and his conquest of Magadha may be dated about A. D. 600. The chronology of the Guptas as derived from all sources will then stand thus. I. Gupta A. G. 0, A. D. 319. II. Ghatot Kacha A. G., 21, A. D. 340. III. Chandra Gupta 1st, A. G. 41, A. D. 360. IV. Samudra Gupta, *Parakrama*, A. G. 61, A. D. 380. V. Chandra Gupta 2nd, *Vikramaditya*, A. G., 81, A. D. 400. VI. Kumara Gupta, *Mahendra*, A. G. 111, A. D. 430. VII. Skanda Gupta, *Kramaditya*, A. G. 121, A. D. 440. VIII. Skanda Gupta, *Lagraditya* or *Lokaditya*, A. G. 133, A. D. 452. IX. Buddha Gupta, A. G. 161, A. D. 480. X. Takta Gupta, A. G. 191, A. D. 510. XI. Nara Gupta, *Baladitya*, A. G. 221, A. D. 540. XII. Vajra, A. G. 251, A. D. 570. Conquest of Siladitya, A. G. 281, A. D. 600. [Note.] (The dates obtained from various sources are:—for Chandra Gupta Vikramaditya, 82 (Udayagiri Inscription) and 93 (Sanchi Inscription), equivalent to A. D. 401 and 412—from Jain Authorities A. D. 409; and from Chinese Authorities A. D. 428—for Skanda Gupta—his death in 133, or A. D. 452 as stated on the Kuhaon Pillar;—for Buddha Gupta 165, or A. D. 484 as given by the Eran Pillar Inscription).

5. The chronological table has been framed upon the following data. 1st, The power of the Indo-Scythians did not begin to decline until the time of the later Hans in China, whose dynasty was only established in A. D. 222. During the latter half of the third century their power was on the decline, and may be supposed to have been finally overthrown by Gupta in A. D. 319. There are great numbers of gold coins of Indo-Scythian type with corrupt Greek and Indian legends which can only be attributed to this dynasty. 2d. A short inscription of Chandra Gupta, at Udayagiri, is dated in the year 82; and a second of the same prince, at Sanchi, is dated in the year 93. These dates of the Gupta era are equivalent to A. D. 401 and 412, which agree with the Chinese date of A. D. 428 for *Yue-gai* (Prinsep, Journal, VI. 665; Des Guignes I. 45, says A. D. 408). But Chandra Gupta on his coins takes the title of *Vikramaditya* and in the Agni Purana (Prinsep, IV. 688) it is said that *Vikrama*, the son of Gadharupa should ascend the throne of Málawa 753 years after the expiation of Chánakya. This event I have already placed in B. C. 325; from which deducting 753 years, we obtain A. D. 428 for the date of Vikrama of Malwa. Col. Tod also quotes a Jain inscription of Chandra Gupta, dated either in 370 or 409. (Trans. R. A. S. 140, 211) in which he is styled *Avantináth*, or "lord of Ujain," which was the capital of Malwa. Here then we have a Vikrama and a Chandra Gupta both kings of Malwa at the same time: two statements which can only be recon-

he says: "In the 5th of the years *Yuan-kia*, in the reign of the Emperor *Wen ti* of the Soung (428 A. D.), *Yu ai*, king of *Kia pi li* in Thian-chu, sent an embassy to the Emperor * * under the Emperor *Ming-ti* of the same dynasty, the second of the years *Thaï-chi* (A. D. 466,) *Kia pi li* again sent an ambassador to China bearing tribute. The *Ly-taï-ki-szu* also mentions an embassy from the king of *Kia pi li* in the year 428 of our era."*

The recognition of the existence of a kingdom of Kapila as one of any mark or prominence whatever at or about the periods indicated in the above—is singularly at variance with the facts supplied by both Fa Hian and Huen Tshang. The former in his itinerary speaks of the capital city in these terms. "In this town there are neither king nor people; it is literally a vast solitude. This is the site of the ancient palace of the king *Pe-tsing*" [Sákya Muni's father] * * "The kingdom of *Kia-'weï-lo-'wei* [identified as Kapila] is a great solitude; the people are scattered, and white elephants and lions are to be apprehended on the roads."†

Two centuries later Huen Tshang reports the result of his observations to the following effect, "Ce royaume a quatre mille li de tour; on y compte dix villes désertes dont le sol est convert de

ciled by supposing them to be the same person under different names or titles, this supposition is confirmed by the coins of Chandra Gupta, on the reverses of which we find, that he took the titles of Vikrama and Vikramáditya. A cave Inscription at Udayagiri of the Samvat year 1093 or A. D. 1036 couples the name of Chandra Gupta with the kingdom of Vikramaditya *(Vikramaditya Rájyam)*. In the Raja Tarangini also it is mentioned that Mátri Gupta was placed on the throne of Kashmir by Vikramaditya, king of Ujain.

According to my corrected chronology of the Raja Tarangini, this happened in A. D. 430. The Satrunjaya Mahatmya (Wilford, Res. As. Soc. IX. 156, and Wilson. ibid. XV. 39 note) also places the 3rd Vikramaditya in Samvat 466, or A. D. 409, From this accumulation of evidence it seems to me certain that a "Chandra Gupta with the title of Vikramaditya was the sovereign of Malwa in the early part of the 5th century of our era."—Bhilsa Topes, pp. 142 to 143.

* I extract this passage from Mr. Laidlay's translation of the Foe Kone Ki. I have not the original at command.

† Laidlay's translation, p. 189.

plantes incultes. La capitale est ruinée à un tel point qu'il est impossible de déterminer quelle était son étendue."*

It is absurd to suppose that this capital and kingdom could have been severally re-edified and re-peopled within so brief a space as intervened between the date of Fa Hian's visit, and the epoch alluded to by *Ma-twan-lin*, nor is it probable, if the kingdom had recovered itself to that point of importance in the scale of nations as the Chinese allusions to 428 A. D. and 466 A. D. respectively would imply, that it should have sunk back into such utter desolation in the second Pilgrim's time; on the contrary the tenor of the expressions made use of in the original *Si-yu-ki* altogether forbids any idea of the kind.† It is far more reasonable to conclude that both the name of the prince, like that of the once flourishing monarchy, should be held to refer to an anterior period to that given by *Ma-touan-lin*, or perhaps with greater justice the whole affair may be put down as an empty and ignorant boast for the honor and glorification of the Chinese monarchs, made in connexion with a site so intimately associated with the early faith of Sákya Muni.

Next in order of Major Cunningham's direct evidences, comes the assertion that "in A. D. 502, the king of India was named *Keu-to* that is Gutto, the Páli form of the Sanskrit Gupta."‡ This statement, be it observed, is also derived from Ma-twan-lin, the author whose evidence I have just shewn such reason to distrust—but, under any circumstances, the information conveyed in this quotation is too vague and indistinct to merit much consideration—to make it of any real service in this discussion, it would be necessary to demonstrate, that the name of *Gupta* was special and exclusive with the Gupta family; whereas the suffix in question was sufficiently common in the ordinary nomenclature of the country. If it had been proposed to assign the appellation to *Srí Gupta*, there

* Huen-Tshang "Julien," p. 126.

† Sit-yu-ki liv. VI. folio 7. "Comme ce pays est désert et inhabité depuis bien de siècles, 'on ne recontre dans les villages que des rares habitants.' Il n'y a ni prince, ni chef suprême; dans chaque ville, on a établi un maître qui la gouverne." —Documents Géographiques, p. 394.

‡ J. A. S. B. VI. p. 65.

might have been more reason in the association; except, that even Major Cunningham might perhaps be unprepared, either to assert that Sri Gupta was *king of India*, or to modernise his date to so late a period as 502 A. D.!

I now arrive at the crowning point of the Chinese evidence which is thus stated: "lastly Huen Thsang names five princes of Magadha, who flourished previous to the conquest of the country by Siladitya in the following order *Lagraditya*, *Buddha Gupta*, *Takta Gupta*, *Baladitya*, *Vajra*." Major Cunningham then proceeds to tack on this list of princes to an imaginary *second* Skanda Gupta, and to argue, that Siladitya, in or about A. D. 600, conquered and superseded the last of these five monarchs: what justification the original text of *Foe-koue-ki* may have afforded, for placing these kings *immediately* prior to Siladitya, I have no means, at this moment, of ascertaining, but, that it has proved a most infelicitous experiment, the now published translation of Huen Thsang's travels too clearly manifests! So far from the author in question giving any authority for these five monarchs being located in the second half of the 6th century, he absolutely assigns them to a period shortly succeeding the *Nirvana* of Buddha or at about 700 years prior to the date at which he himself visited India! I transcribe this passage entire in order that there may remain no possible doubt of the justice of my somewhat startling rectification!

"Après le *Nirvâna* du *Buddha*, un ancien roi de ce royaume, nommé Cho-kia-lo-o-tie-to *(Çakrâditya)*, rempli de respect et d'amour pour le *Bouddha*, construisit â ses frais ce Kia-lan *(Sâmghârâma)*.

"Ce roi étant mort, eut pour successeur son fils Fo-to-k'io-to *(Buddhagoupta)*, qui, après avoir pris les rênes de ce grand royaume, construisit plus loin, au sud, un autre Kia-lan.

"Un peu plus loin à l'est, son fils, le roi Ta-t'a-kie-to *(Tathâgata)*, bâtit un autre couvent.

"Plus loin au nord-est, son fils Polo'ot'ieto *(Bâlâditya)* bâtit un autre couvent.

"Dans la suite, voyant qu'un saint religieux venait de la Chine, et se dirigeait vers lui pour recevoir de ses mains les provisions nécessaires, il fut transporté de joie, quitta son trône et embrassa la vie religieuse.

"Il eut pour successeur son fils Fa-che-lo (*Vadjra*), qui, plus loin au nord, construisit un autre couvent.

"Quelque temps après, un roi de l' Inde centrale bâtit à côté un autre couvent.

"De cette manière, six rois, qui montèrent successivement sur le trône, se livrèrent chacun à de pieuses constructions. Le dernier de ces rois entoura tous ces couvents d'une enceinte de murs en briques et les réunit en un seul. pp. 149, 150 * * * * * Dans le séjour de tous ces hommes vertueux, régnaient naturellement des habitudes graves et sévères; aussi, depuis sept cents ans que ce couvent existe, nul homme n'a jamais enfreint les règles de la discipline."—p. 152.

Having now shewn how baseless Major Cunningham's whole fabric is, I need scarcely occupy myself with the adventitious supports with which he designs to give it strength; but it may be instructive to examine his reasoning on these lesser matters, in order that the public may still further judge of the soundness of the conclusions of an antiquarian guide it might otherwise be disposed to rely upon.

First in order of these subordinate aids is placed certain vague information contributed by *Ma-twan-lin*, regarding the power of the Indo-Scythians having survived in India till A. D. 222—even supposing our authority to be trustworthy in the general assertion, we require a much more specific exposition of the geographical limits to be assigned to the Chinese idea of "*India*,"—we have already seen it used somewhat loosely by this same author, and it is quite in accord with probability that successors of Scythians may have continued to reign in various outlying kingdoms of India or even in isolated portions of India Proper until long after the 3rd century A. D.; I freely adverted to these points in my previous essay, and moreover quoted a curious passage from M. Pauthier, which if borne out—would materially shake all hitherto-received opinions as to the connexion between the Guptas and the Indo-Scythians.

I remarked—"It is clear that in some divisions of Northern India, the Tochari, or Yuë-Chi, continued to furnish Scythic opponents for the occasional display of heroism on the part of the indigenous monarchs until at least the early portion of the 3rd century

of our era.* The complete decay of the Indo-Scythic empire, whether due on the one hand to successive losses of frontier provinces, or to the less perceptible fusion† of the races of conquerors and conquered on the other, was manifestly a work of time, and apparent traces of the surviving power of the race were to be detected west of the Indus so late as the end of the 4th century."

But, for reasons already stated—I by no means concur in the supposition that "they were finally overthrown by Gupta," either in A. D. 319 or that at any time this monarch made any great progress against them. The coins of the dynasty in this respect, bear out the general tendency of the inscriptions—and would lead us to conclude that the more important acquisitions of territory were not made by the Gupta family until the reign of Chandra Gupta 1st, or more decisively under the rule of Samudra Gupta—Ghatot Kacha, though he imitates Scythian devices in his mintages,‡ does not directly adopt their more special type, with the Parvati APΔOKPO

* Note upon Ma-twan-lin, J. A. S. B., vi. 63; also Pauthier, "Thian-tchu," *extract* from the Journal Asiatique, 1839, note, p. 9.

† M. Pauthier (Thian-tchu, Journal Asiatique, 1839) notices a curious enquiry, suggested by the similarity of meaning existing between the words Youë chi and Chandra Vansa: subjoined are M. Pauthier's translation of the Chinese text and his own notes on this head:—

"Dans la Relation des contrées occidentales (*Si-yu*), le royaume du *Thian-tchu* est nommé par quelques-uns *Chin-thou*; et on le dit situé au sud-est des Youë-chi* ou 'peuple de race lunaire' à la distance de quelque milliers de *li*. Les mœurs de ses habitants sont les mêmes qui celles des Youë-chi."† Page 7.

* "*Youë-chi*, mots éthniques qui signifient *de race lunaire*, absolument comme le terme Sanskrit चन्द्र वंश *tchandra vansa*. Voy. la notice sur ce peuple célèbre (que l'on croit être les Indo-Scythes des historiens occidentaux), que nous avons traduite du Pian-i-tian, liv. LII. art. 2."

† "*Sou yu youë-chi-thoung*: mores cum (τοῦ) *Youë-chi* (moribus) iidem. Quelque extraordinaire que cette assertion paraisse, elle confirmerait le soupçon que nous avons déjà émis ailleurs, que les Youë Chi ou hommes de race lunaire pourraient bien avoir la même origine que les rois Indiens, aussi de race lunaire, Tchandra-vansa."

May not these coincidences, conjoined to the curious verbal similarity to be detected between NANAIA and NANO, suggest the possibility of the meaning of the latter referring to the moon, and thus PAO NANO PAO being, the King, the Lunar King, or King of the Lunar Race?

‡ J. A. S. B. Vol. V. pl. xxxvi. fig. 12. Ariana Antiqua, pl. xviii. 14.

Reverse,* which, as far as we at present are able to decide, seems to have been first appropriated by Samudra Gupta. The more extended conquests of the house of Gupta do not indeed appear to have been consolidated till the time of Skanda Gupta himself—when the dynastic power may be supposed to have reached its zenith† and thereafter to have suffered decline. We have no immediate means of determining whether Mahendra Gupta‡ was directly succeeded by Buddha Gupta, but it is clear, that under the latter, the extent of the empire had become sensibly diminished.§

Of the miscellaneous items assembled under the second heading in support of the proposed chronological table, I may pass by the inscription dates. I do not contest the term of years indicated by each but seek to discover the era to which the given numbers apply; hence as these figures can in no wise aid in the solution of the difficulty, they scarcely demand further notice in this place.

I now come to the argument wherein it is sought to prove that Chandra Gupta the II. of our list, is identical with *the* Vikramaditya of Malwa of the early part of the 5th century. I can afford to give Major Cunningham a Chandra Gupta and a Vikramaditya for any

* See J. A. S. B. iv. pl. xxxviii. figs. 16 and 17; pl. xxxix. fig. 19; Vol. V. pl. xxxvi. fig. 14, &c. Ariana Antiqua, pl. xviii. figs. 6, 7, 8, 9 and 10.

† J. A. S. B. vii. 37 and 348.

‡ As Major Cunningham has taken some liberties with the Gupta succession, I append, for facility of reference, Professor Mill's authoritative list, as given J. A. S. B. vi. 8.

1. Gupta or Srí Gupta (Mahárája).
2. Ghatot Kacha.
3. Chandra Gupta I. (Mahárájadhirája).
4. Samudra Gupta.
5. Chandra Gupta. II.
6. Kumára Gupta.
7. Skanda Gupta.
8. Mahendra Gupta—noticed as a minor in the Bhitári Lát inscription, the name is contributed by coins.

The Erun pillar furnishes us with the name of a 9th prince of this house—*Buddha Gupta*, but the order of his accession is undetermined. See J. A. S. vii. 634.

§ Bhim Sén's pillar at Erun and inscription on temple at Erun.

period of Indian history that he may desire, subsequent to the date of the prominent individuals who made both name and title common in the land, but I am not prepared to concede that sufficient cause has been shown either to authorize Chandra Gupta II. being brought down to the 5th century—or to justify his being converted into a special Vikramaditya. The former point has been already sufficiently discussed, the latter calls for further remark. In the first place I must observe, that in the whole series of the Gupta inscriptions, in which the name of Chandra Gupta II. occurs—in no one instance is that name associated with any such title as Vikramaditya.*

Indeed, in the Sanchi inscription, he is expressly mentioned as being "known among his subjects" by another designation, that "of *Deva rája!*"†

These very significant facts may have escaped Major Cunningham's notice, but to indicate—apart from these, how much of special pleading is involved in his argument on this head—I may note, that he relies mainly, for his proof of the *exclusive* right of Chandra Gupta to the honorific title of Vikramaditya—on the occurrence of the words *Srí Vikrama*, &c. on the reverses of some of his coins—altogether ignoring the rather damaging incident, that the full title of Vikramaditya is found also upon the coins of Skanda Gupta.‡

After the concession I have offered above, it will be useless for me to follow the attempted identification, as tested either by the pretended prophecies of the Puranas, by Tod's very dubious inscription, by the contributions of Jain authorities, or by the shadowy indications afforded by the Rája Tarangini.

In regard to Major Cunningham's third point,§ i. e. the notice on the Kuhaon pillar of Skanda Gupta's death—this simply proves

* Bhitárí Lát, p. 4, J. A. S. B. vi.; Udayagiri Inscription Bhilsa Topes, p. 151.

† J. A. S. B. vi. p. 456.

‡ J. A. S. B. v. pl. xxxvi. fig. 17; Jour. Roy. As. Soc. xii. pl. iii.

§ "3rd. The date of Skanda Gupta's death, which is found on the Kuhaon pillar, is the year 133. No era is stated; but it must of course be that era which was used by the 'royal race of Guptas,' of which he is said to have been born; and which could only have been the *Gupta kál*, or Gupta era.

His death therefore occurred in 319 + 133 = 452 A. D. as given in my Table. p. 144."—Bhilsa Topes, p. 144.

nothing: as I said before, the annual dates need not be contested, it is the cycle to which they belong that continues to be the enigma. But here again the advocate for the modernization of the Guptas seems to have committed himself, inasmuch as he is found assuming Skanda Gupta's death to have taken place in 133 of the year of his dynasty—while the original, from which he quotes, is given by Prinsep as "in the year one hundred and thirty-three *after the decease* of Skanda Gupta!*

The fourth† item of data for the chronological table—the Erun pillar record of 165 is merely as valuable as the third!—Buddha Gupta may, in that year of a particular epoch—have erected the commemorative stone, but this in the absence of other evidence no more supports Major Cunningham's position that 165 is equal to A. D. 484, than any other given number would have done.

I am glad to find that there is one point‡ in which Major Cun-

* I do not wish for a moment to conceal the fact that Prinsep's translation of the passage in question is hardly satisfactory; he himself distrusted it—and if Major Cunningham had made any such observation, I should have concluded that he had obtained a new and improved transcript and translation, hut it is probable that if he had done so he would possihly have discovered that the real date is 141 and not 133.

† "4th. The date of Buddha Gupta has heen determined hy the inscription at Erun, which records the erection of a pillar in the year 165 or A. D. 484. An inspection of the tahle will show how well this date agrees with the period which must he assigned to Buddha Gupta on the authority of Hwan Thsang; according to whom *Fo-thokiu-to* or *Buddha Gupta* was the fourth prince prior to Siladitya's conquest of Magadha in A. D. 600. The coins of Buddha Gupta may he seen in pl. ii. figs. 55 and 57, of Mr. Thomas's Essay on the Sah kings of Surastra, and I can confirm the reading of the legend, which he gives with some hesitation as Buddha Gupta—I procured five of these silver coins from a traveller at Benares, of which I have given away four; hut I still possess sealing-wax impressions of them all, from which I have been ahle to recognise the engraved specimens."—Bhilsa Topes, p. 144.

‡ "5th. The coins of Nara Gupta *Báladitya*, are scarce. Of two specimens in gold, that have heen in my own possession, I have still impressions; hut the type may be seen in fig. 22, pl. xviii. of Wilson's 'Ariana Antiqua.' On the ohverse under the Rája's arm is written *Nára* and on the reverse *Báladitya*. The small silver coin fig. 19, pl. xv. of the same work, most probably also helongs to *Nára*. I read the legend:—

ningham is able to support me, that is in the reading of the silver coins of Buddha Gupta.* I could have wished to have been able to compliment him equally on the success of his transcription of the legend of the silver piece, depicted in Ariana Antiqua, pl. xv. fig. 19—which he proposes to assign to Nára Gupta Báladitya; now, as this monarch has proved, as far as the Gupta dynasty are concerned, to be a very ancient myth, I need not seriously contest the point, but I may remark, that I think Major Cunningham would have been wise to have left my reading† of that coin unassailed—I had had the piece under my eye, had transcribed from the original each letter and fragment of a letter—moreover, at the moment of this examination I had before me five other specimens of coins with identical legends, and I then deciphered, as I even now can confirm from my Note-book—the following letters :—

परम भ रज श्रीस्कन्दगुप्त क्रमदत्य

The seven first letters are indubitable, the name of Skanda Gupta is damaged, but quite enough remains of the first and second compound consonants to render their recognition thoroughly satisfactory. The two double letters of the word *Gupta* were only represented by the subjoined त; but, as Major Cunningham also finds Gupta on the coin, I conclude he will not deny me this. The two opening letters of Kramaditya are almost obliterated, but, there can be little doubt about the entire word, which other identical specimens supply in full legibility.‡ The only real difficulties in the conclusive decipherment of the coin were fairly stated by me at the time, to the following effect—"These legends are often imperfect, and very constantly of unequal length, resulting apparently from the amount of room the die-sinker happened to find himself possessed of, as he proceeded with his engraving. Thus in one coin (Wilson A. Art, pl. xv. fig. 19,) the second word [भगवत] appears to have been contracted into its initial letter, and the three letters

Paramadhi Rája Srí NÁRA GUPTA, *Báladitya.*

[This seems to conclude all that Major Cunningham has to say on the subject of the Guptas, the subsequent extracts do not form *continuous* portions of his text.]

* J. R. A. S. B. XII. 70.

† J. R. A. S. XII. 66.

‡ A. A. XV. 16; J. A. S. B. XII. pl. ii. 45 and 46.

that should have succeeded are replaced by two letters serving to express the word राज." Had I not shewn, in entering into all this detail, that I had fairly examined the *original* piece, there might have been more excuse for Major Cunningham's venturing to correct me on the strength of a mere engraving; which, however well executed—as it certainly is—in its main devices, must necessarily have been expected to prove somewhat imperfect in the expression of the fragmentary letters of a legend, the alphabet of which was unknown to the artist.

I need scarcely advert to the attribution claimed for the gold coin No. 22, pl. xviii. Ariana Antiqua.

As I do not, at this moment, propose to do more than notice the Gupta portion of the question as it stands between myself and Major Cunningham, I shall reserve, for a future opportunity, my reply to his proposed rectification of the earlier or Sáh epoch; but, there are two points noticed in the Bhilsa Topes as apropos to that period which may properly be disposed of in this place.

The Gupta inscription on the Allahabad column, in enumerating the conquered and tributary states of Samudra Gupta makes mention of "precious metals brought as tribute by the heaven-descended monarch, the *Sháhán Sháhi*, the Scythians, the Huns, &c."* Upon this Major Cunningham proceeds to argue,† that if the Guptas are to date, as Al Birúní would make them, that this reference of Samudra Gupta must be taken to allude to the "Sassanians!" I think the author would have done well to have followed Prinsep in this matter, and to have confined himself to the inference that in this "we have a limit to the *modernicity* of our inscription," as suggested by that most excellent archæologist, but I am prepared to contend, that the title of Sháháu Sháh is not *peculiar* to the Sassanians, and that if

* J. A. S. B. VI. 979.

† Major Cunningham's words are—"Samudra Gupta according to the Allahabad and Bhitári inscriptions was the fourth prince of the Gupta dynasty; and if we allow twenty years to each reign, Samudra will date from 60 to 80 of the Gupta era, or from 138 to 158 A. D., but in the Allahabad pillar inscription Samudra mentions the *Sháhán Sháh* (that is one of the Sessanian kings of Persia) as his contemporary, whose dynasty did not attain the throne until A. D. 223," * * page 147.

any thing (apart from the present issue) it is more appropriate to the Mulúk-i-Towaif, whose head was essentially a king of kings,—the constitution of the Parthian system of government was, that there were "kings in each city,"* and one Suzerain over the whole: who entitled himself ΣΑΤΡΑΠΗΣ ΤΩΝ ΣΑΤΡΑΠ Satrap of Satraps,† ΒΑΣΙΛΕΩΣ ΒΑΣΙΛΕΩΝ,‡ or the Semitic מלכין מלכא *Malkín Malká*,§ as the case might be. The Sassanians imitatively adopted the latter title, without however, continuing the political constitution, which had rendered the designation so peculiarly appropriate. From *Malkán Malká*, the later members of the Sassanian dynasty proceeded to خدا Khuda,‖ the then current term for King—but neither Sháh nor Sháhán Sháh is ever found on their coins, though that the term existed, we have of course evidence in the name of

* *Tabari*, Persian MS. همه بدست ملوك طوايف بود و هر شهري را بادشاهي بود.

† Gotarges' Greek inscription at Behistun, quoted by Rawlinson, J. R. A. S. XI. 118.

‡ Coins, J. A. S. B. II. p. 34, &c.

The following early Parthian Monarchs adopt the title of ΒΑΣΙΛΕΩΣ ΒΑΣΙΛΕΩΝ on their coins!

1st. Arsaces, VI. Mithridates I. 173 to 136 B.C.
2nd. Ditto, XII. Phrahates III. 70 to 60 B.C.
3rd. Ditto, XIII. Mithridates III. 60 to 54 B.C.
4th. Ditto, XIV. Orodes I. 54 to 37 B.C.
5th. Ditto, XV. Phrahates IV. 37 B.C. to 4 A.D.
6th. Ditto, XIX. Artabanus III. 13 to 42 A.D.

The first and second Kings of this list continue however to employ the simple ΒΑΣΙΛΕΩΣ Arsaces XII. likewise styles himself ΒΑΣΙΛΕΥΟΝΤΟΣ ΒΑΣΙΛΕΩΝ. *Ruler of Kings.*

The three Princes noted below take the title of ΘΕΟΠΑΤΟΡΟΣ

1st. Arsaces, IV. Phraapatius 196 to 181 B.C.
2nd. Ditto, VII. Phrahates II. 136 to 126 B.C.
3rd. Ditto, IX. Mithridates II 123 to 87 B.C.

"View of the coinage of the Parthians," by John Lindsay, *Cork*, 1852.

§ Coins Num. Chron. XII. 68.

‖ See Longperier "Essai sur les Medailles des Rois Perses" coin 47, page 52, coin 48, &c. See also Hamzah Isfaháni, p. 47, خداة كشان Regis interfectores Journal Asiatique 1841, pp. 145, 278, خدا نامه Livre des rois et Khodaï boum le maître de la terre!

Shahpuhuri (شهپوهري otherwise written سهي پوهر)* and the word is likewise found upon gems, in a position that clearly indicates its *kingly* meaning.†

It is possible that the term had somewhat of a local currency in Kermán, Seistán, &c. as distinguished from the Semitic *Malká.* I must add, however, that the Indo-Sassanian coins still retain the *Malká* in their Pehlaví legends, though the Sanskrit षहि or षाहि *Sháhi*‡ is also found, in various shades of alphabetical development, on some types of this mixed coinage.§

The only other point I have now to advert to, also very closely concerns the Guptas. Major Cunningham remarks:—"The alphabetical characters of the Saurashtra coins are so widely different from those of the pillar and rock inscriptions, and at the same

* Inscriptions at Nakshi Rustam, and Kermán Sháh. De Sacy and Journal Asiatique, XI. 653.

† Ouseley Medals and Gems (Lon. 1801) J. R. A. S. XIII. 418. J. A. S. B. III. Pl. XXI. 10 and 11. Pl. XXV. 6. A. A. XXI. 22, XXVII. 9.

‡ Had Major Cunningham been better up in his subject, he would have found a tempting argument, in the *Daiva putra Sháhi*, of the Allahabad inscription; which Prinsep erroneously supposed to refer to the Parthians on the strength of the term ΕΚΓΕΝΟΥΣ ΘΕΩΝ, as found in the triple inscriptions at Naksh-i-Rustam (De Sacy Mémoires sur Div. Ant. de la Perse, p. 62, Ker Porter 548); but, Prinsep might have seen from the text itself, that these terms are applied to the Sassanian monarchs *Bábek*, *Ardeshir* and *Sapor*, and have no reference whatever to the *Ardevan*—the last of the Arsacidæ—whose prostrate figure appears in the sculptured group the inscription serves to illustrate. I am not however in a position at this moment, to determine how much of this assumption of godlike descent, by the early Sassanians, may have been derived from their predecessors' style of imperial glorification.

But all discussion on this head is rendered illusory, in the fact, that Prinsep himself confesses, that "the two first letters [दैव] are slightly obliterated, and might be read either *Dábha* or *Dára-putra.* To judge, however, from the author's own facsimile the second letter is far more like a भ *Bh*, than a व *V*; indeed, it differs materially in form from other well ascertained V's in the same line. Nor do I think the proposal to read the second letter as र R, one whit more admissible. As for his diphthong, it seems, from his own alphabet, attached to the plate, that this can only be rendered as the vowel o—making the word दोभ, *Dobha.* See J. A. S. B. VI. p. 974.

§ A. A. XVI. 18, XVII. 11, XXI. 20; J. A. S. B. V. pl. iii. 3; J. R. A. S. XII. p. 89.

time are so much similar to those of the Guptas, that it is impossible not to conclude, that there must have been a long interval between Asoka and the independent Sáh kings and an almost immediate succession of the Sáh kings by the Guptas."*

In reply to this, I have only to re-quote in this place, my original authority for an inference to a different effect, leaving my readers to elect the author of the Bhilsa Topes to a higher position as a palæographer than Jas. Prinsep, if they so will it. The following extracts from the J. A. S. B. were printed in my paper on the Sáh kings.† "The character [of the Sáh inscription] is only one remove from the Buddhist alphabet of *Girnár*."‡ * * * "The *Sanskrit* character of the third century B. C. differs only so much from the original form [the Buddhist alphabet of the 5th century B. C.] as the habits of a class of writers distinct in religion and more refined in language, might naturally introduce."§

Prinsep goes on to say "The Asoka alphabet‖ (the Sanskrit one) agrees very closely with that of our *Saurashtra* coins, which may thence be pronounced to be anterior to the Gupta series. The *Gujerat* plates dated in the third century of the Samvat era [?], differ but little from the *Allahabad* pillar or *Samudra-Gupta* inscription, but that little is all in favour of their superior antiquity."¶

I conclude that Major Cunningham does not wish to date the Sáh coins at any later epoch than the Sáh inscription, as he must be

* P. 148. † J. R. A. S. XII. 24. ‡ J. A. S. B. VII. 337.

§ J. A. S. B. V. 275. Prinsep, J. A. S. B. VII. 275. The words are as follows: the Sanskrit character of the 3rd century B. C. &c. differs only so much "from the original form as the habits of a class of writers distinct in religion and more refined in language might naturally introduce."

Major Cunningham himself undesignedly concedes much towards this argument in the fact he notices of "the extremely rare use of compound letters" in the Buddhist legends engraved on the Bhilsa Topes. He remarks "only three instances occur throughout all these inscriptions; and they are certainly exceptions to the common practice of Asoka's age, which adhered to the simplest Páli forms." B. F. 268.

‖ It may be necessary to remind my readers that Asoka's name occurs in the Sáh inscription—this is the sole instance of its use in inscriptions. In his own edicts he calls himself *Devánampya Piyadasí*, J. A. S. B. VII. 219 et seq.

¶ Ibid, 276.

well aware how much the Numismatic characters of one and the same alphabet are liable to differ from their lapidary equivalents! So, I will simplify the question by confining myself to the style of writing used upon rocks, stone pillars and copper-plates.

Major Cunningham seems disposed to admit of but one single element, as liable to affect the march of alphabetical development—that of time—but to show how fallacious any notion of a *necessarily* progressive change would be, I may call attention to the very slight modification, that is seen to have taken place in the local alphabets of Guzrát, &c. during ten or eleven centuries—and I would enquire, if his argument is to hold good, how much of difference ought we to be able to detect between the alphabet of the Vallabhi copper-plates, which he would date in the 6th century A. D. and the style of writing in use in the Western Caves, which is almost identical with the characters of the Buddhists of the 5th century B. C. And yet, a reference to Prinsep's facsimiles* will show how essentially limited the alterations effected by this lapse of ages really were! Jas. Prinsep, as we have seen, was prepared—with his usual frankness—to concede that there were other causes likely to influence these alphabetical mutations—though his original idea had clearly been to assign all impulse in this direction to the effect of time. Had he lived to perfect his theory, I doubt not, that he would have accepted other agencies as playing an important part in the results to be accounted for; prominent among these would, I think, have to be placed the advance or retardation due to nationality or other *local* influences; otherwise it would be difficult indeed to account for the various separate alphabets that we find in all their independent diversity at a later period of Indian progress.†

* J. A. S. B. VII. pl. xiii.

† As my readers may be glad to learn what Al-Birúní says on the state of the varieties of writing current in his day. I append the passage entire.

"On compte plusieurs écritures dans l' Inde. La plus répandue est celle qui porte le nom de *siddha-matraca* (سد ماترك) ou substance parfaite; elle est usitée dans le Cachemire et à Benarès, qui sont maintenant les deux principaux foyers scientifiques du pays. On se sert également de cette écriture dans le Madhya-Deça, appelé aussi du nom d' Aryavartta. Dans le Malva, on fait usage d'une écriture appelée *nagara* (ناكر): celle-ci est disposée de la même manière que la première; mais les formes en sont différentes. Une troisième écriture, nommée

Prinsep's own impression, above quoted, will display how little reliance could be placed on a judgment, which did not take this element into consideration, for he assigns, on the mere ground of forms of letters, a higher antiquity to the Guzrát copper-plates, than he does to the Gupta inscriptions; whereas, we now know, that the Guptas preceded the Vallabhis!

Had he confined himself to tracing the alphabetical advances made by these different sections of Indian races, instead of comparing two series of literal signs that had been thus far matured by different hands, he would have worked upon surer ground. To support my assertion, I would beg attention to the varieties of types of letters to be found on the nearly contemporaneous Gupta inscriptions. If we examine the Allahabad writing* and contrast it with that on the Bhitari lât,† we discover considerable difference between the general configurations of the majority of the characters in each —varying from scarcely perceptible modifications, to an absolute difference of form in others; for instance, the ख, ग, ध, प and म are virtually the same characters in both inscriptions, but their outlines are by no means identical, while the signs ण, स, ह and स are, so to speak, different letters. To carry out the contrast, let us refer to the Bhilsa‡ inscription. Here again we find a general change in the aspect of the letters and most distinct modification or absolute divergence from the Allahabad type in the following characters— ख, ङ, ण, ध, प, भ, म, र, ह, म, ष and स. I need not, I imagine, pursue

arddha-nagary (اردن كوري), c'est-à-dire à moitié nagari, et qui participe des deux premières, est usitée dans le Bhatia (بهاتيه) et dans une partie du Sind. Parmi les autres écritures, on peut citer le malcâry (ملقاري), usité dans Malcascheva (ملقشوا), au midi du Sind, près de la côte; le besandiba (بسندب), employé à Bahmanava, ville appelée aussi Mansoura; le karnâta (كرناث), usité dans le Karnate, pays qui donne naissance aux personnes appelée, dans les armées, du nom de Kannara (كنرة); l'andri, employé dans l'Andra-Deça ou pays d'Andra (انتر ديش); le dravidi, usité dans le Dravida ou Dravira; le lari, dans le Lar-Deça ou pays de Lar; le gaura (كوري), dans le Purab-Deça (پورب ديش) ou région orientale (le Bengale); et le bikchaka (بيكشك) dans le Oudan-Pourahanâka (اودنپورهناك). La dernière écriture est celle dont se servent les bouddhistes (البد)." *M. Rienaud*, Mémoire sur l' Inde p. 298.

* J. A. S. B. VI. 969. † VI. 1. ‡ VI. 455.

this dry subject in greater detail; but, I have some further observations, that I am desirous of offering on the general topic of the early status of Indian systems of writing.

Prinsep has himself suggested the enquiry as to how much of change of alphabetical symbols might be incident upon the use of a more perfect language, as compared with the requirements of the local Páli. Another point of important bearing on the main question, is the probable modification the written or cursive literal signs were subjected to as opposed to the stiff and formal outlines of the characters of the rock inscriptions?

Up to this time, it has been usual to consider the old Páli writing as the basis of all Sanskrit alphabets, we need not contest this inference, but we may fairly enquire, if we have reached the date of the first use of that character, in the epoch assigned to the early Buddhist inscriptions? the reply would reasonably be in the negative! This system of writing, in its sufficiency for all purposes of its own proper linguistic expression, may well have continued for a lengthened period unchanged, as far as inscriptions were concerned, at the same time, that there may have been a progressive advance in the cursive hand, of which we have no immediate record.

We have evidence, in sufficient abundance, to prove that the Eastern nations often availed themselves of a cursive hand, in common with the more formal character reserved for inscriptions. These would each be naturally affected, in the ultimate determination of forms—by the material which had to receive the writing.

Thus the straight wedge-shaped elements of the cuneiform alphabet* were singularly well fitted for easy expression on tablets of Babylonian Clay, and equally suited to rock inscriptions, while the written hand executed only on a smooth surface, presented no difficulties to any series of curves or complicated lines. In addition to leather† and other materials, the ancient Persians, we also learn wrote upon *Túsٔ* (Birch-bark). The Indians we know adapted this

* Layard "Discoveries," &c. 346 and 601, &c. J. B. A. S. XVI. 215.

† Assyria—P. H. Gosse, London, 1832, p. 546.

‡ Hamzæ Ispahání كتاب تاريخ الامم, p. 961 and xxv. "Libri inventi sunt, in quibus depositæ erant variæ eorum disciplinæ, omnes lingua Persica antiqua scripti in cortice tûz." See also Ayín i Akberi, II. 125.

substance to the same uses,* and possibly the Indian Vedas are indebted for their preservation to this very material; whether its employment was limited to the population whose dialects were expressed in the Arian character we have no means of saying, but in all probability, if the Northern Indian races knew of its use, the Magadhis would not have remained long deprived of it or some suitable substitute; that they also wrote with *ink* is amply established by the discovery of letters so written on the relic caskets at Sanchi.†

I imagine it must be conceded, whether on the indications afforded by inscriptions, coins or Buddhist relics, that the ancient Páli or *Magadhi* alphabet had once a very extended currency, and likewise that for a lengthened period it retained its separate identity. It occurs in Asoka's edicts at Delhi,‡ Allahabad, Matia, Bakra, Dhauli and Girnar, its appearance in these several localities§ would, *prima facie*, imply, either that it was intelligible to the people at large throughout the circle embraced within these geographical boundaries, or that it was the recognised sacred alphabet of Buddhism: opposed entirely to the latter supposition is the departure from its use, in the Kapurdigiri text of *the* edict itself, and the modification the language is seen to have been subjected to in some of the *Páli*

* Masson in A. A. p. 60 and 84. See also fig. 11, pl. iii. Ibid. Masson continues his remarks on substances used to receive writing: "In one or two instances I have met with inscriptions; one scratched with a stylet or sharp-pointed implement around a steatite vase extracted from a Tope at Darunta; another written in ink around an earthen vessel found in a Tope at Hidda; and a third dotted on a brass vessel." See also Reinaud Memo. sur l' Inde, p. 305.

† J. R. A. S. XIII. 110. Bhilsa Topes, 299.

‡ Of the two stone pillars at Delhi, one was moved down from near Khizrabad, at the foot of the Himalayas—the other was taken from Mirat—Jour. Arch. Soc. Delhi, 70, 1850.

§ Other inscriptions in this character occur at—

1. *Sanchi*—J. A. S. B. VI. pl. xxvii. page 461 and VII. pl. lxxiii. 562.

2. *Gya*—Caves, ditto VI. pl. xxxv. Nos. 2 and 3, page 676, these are of the epoch of Dasaratha who followed Suyasa the immediate successor of Asoka!

3. *Cuttack*—Udayagiri Caves, J. A. S. B. VI. pl. liv. p. 1072.

4. *Ibid*—Khandagiri Rock, J. A. S. B. VI. pl. lviii. p. 1080. And we may now add a but slightly modified form of writing as discovered in the Mehentélé inscription in Ceylon. J. R. A. S. XIII. 175.

transcripts to meet apparently the local dialects of each site.* On coins, it can scarcely be thought to hold any religious signification, but, the available medallic testimony contributes largely to the inference, that these characters formed the ordinary medium of record in the majority of the states included within the limits above adverted to. In this alphabet exclusively are expressed the legends of numerous series of coins of purely local type,† its characters are found associated on the one part with the Greek of Agathocles and Pantaleon‡ and its phonetic signs are conjoined with counterpart Arian legends on certain classes of the *Behat* coins.§ The Buddhist relics do little towards elucidating the expansive spread of this style of writing,‖ but—if rightly interpreted—they illustrate in a striking manner the antiquity of its ordinary employment in its even then fixed form.

Another point of view from which this Palæographic enquiry has to be regarded, is the influence exercised by the conterminous alphabet of Semitic origin—that equally served to express modified forms of the same speech. This character—also claiming the highest antiquity—existed as indigenous South of the Hindú Kush¶ and extended over the Southern base of the Himalaya as far as the Doáb of the Jumna and Ganges. This style of writing, though defective in its Semitic organization, would seem to have found full favour in its day and to have been very extensively employed, as is proved by its extant remains in inscriptions,* on coins, strips of copper, relic cylinders, &c.†

Its currency in India proper is shewn in the legends discovered

* Prinsep towards the conclusion of his review of the various lât inscriptions observes, "The vernacular language of India at that period, then, varied in different provinces:—it approached more to the Sanskrit in the North-west; diverged from it in *Magadha* and Kalinga:—but it was in both places essentially what is now called *Páli.* * * There is no trace of genuine prákrit in either of the dialects." VII. 280.

† J. A. S. B. IV. pl. x. and xxxv. and VII. pl. lx. and lxi.

‡ J. A. S. B. V. pl. xxxv. 8 and 9; A. A. VI. 7, 8, 9 and 11.

§ J. A. S. B. VII. pl. xxxii.

‖ J. R. A. S. XIII. p. 108. "Bhilsa Topes," p. 299, &c.

¶ A. A. p. 243. * J. R. A. S. XII. p. 153. † A. A. pl. ii.

in the Tope at Manikyala,* its uniform appearance on the money of the Greek and Scythian dynasties of the Punjab, and its limit Eastward is established by the bilingual Buddhist coins of Behat,† and, if the attribution may be held to stand, by the satrap coins of Hustinapore on the Ganges.‡

Major Cunningham, I understand, proposes to assign these bilingual Behat coins of Kunanda to the period of the nine Nandas: § if this be correct, the Páli alphabet of Northern India must have improved upon the Southern type, and my supposition of an independent advance upon the original form of the alphabet, while the old character was still generally retained, is in a measure confirmed. But, whatever of influence this Bactrian style of writing may once have had upon its contemporary at the point of contact, it was certainly doomed to give way before its more efficient competitor and in but brief space to be no more seen !||

* J. A. S. B. III. 559—Ibid, pls. xxii. and xxxiii.

† J. A. S. B. IV. pl. x. fig. 16 and VII. pl. xxxii. figs. 2, 3 and 4.; A. A. XV. p. 23.

‡ J. A. S. B. new series No. lxx. No. vii. of 1854, page 681.

§ The nine Nandas reigned one hundred years (415 B. C. to 315 B. C. Prinsep, U. T. page 99!

|| Hwen Thsang who usually gives us very precise information about the language and alphabets of the countries he visited, is silent on the subject of the limit of the Indian alphabet to the Northward. He however, notices that in Oudyâna "Quoiqu'ils parlent une langue particulière, elle ressemble cependant, en grande partie, à celle de l' Inde. Les caractères de leur écriture et les usages de la politesse offrent aussi beaucoup de ressemblance (Documens Géographiques, 426). In Bannian, L' écriture, &c. ressemblent à ceux du royaume de Toukhâra;" (p. 373). Kapissa is represented [it is not clear whether *by* Hwen Thsang] likewise as using a form of writing but little differing from that of the Tokhári, but it is added, "mais les mœurs, la langue parlée et les lois sont fort différentes." (p. 392). The account of the Tokhári language given, apparently on the authority of Huen Tsang, though it is to be remarked that he did not visit the capital (p. 464)—is to the following effect! "Leur langue parlée diffère peu de celle des autres royaumes; les caractères primitifs de leur écriture se composent de vingt-cinq signes qui se multiplient en se combinant ensemble et servent à exprimer toutes choses. Ils ecrivent horizontalement de gauche à droite." (p. 455).

Chart
TO THE
TWENTY FOURTH MEMOIR
ON THE LAW OF STORMS
being
THE
SUNDERBUND CYCLONE
of 14th 15th May
1852
BY
Henry Piddington
85°
90°
25°
20°
15°
Rungpore
Chilakhal
Dinagepore
Maldah
Jeypore
Bogorah
Jumulpore
Centre 15th
Rampore Bauleah
Jungypore
Moorshedabad
Dacca
Comillah
Kishenagur
Muddumtarre
Katgorah
Jessore
Bancorah
Calcutta
Bagundee
Burrisal
Chittagong
Khedgree
Hidgillee
Balasore
Centre 14th
Pt Palmeras
Cuttack
False Pt
Juggernath
Black Pagoda
Ganjam
Adelaide
Centre 14th
9 P.M.
Bimlipatam
Vizagapatam
Centre 13th
Centre 13th
Foundered 16th May
Coringa
Amazon 12th
Limehouse 13th
London 12th
Emus
Centre 10h 30 P.M. 12th May
Precursor 13th May

A Twenty-fourth Memoir on the Law of Storms, being the CALCUTTA AND SUNDERBUND CYCLONE *of 14th and 15th May,* 1852.—*By* HENRY PIDDINGTON, *President of Marine Courts.*

I have named this the SUNDERBUND CYCLONE, because it is a remarkable instance of a Cyclone passing up through the Sunderbunds, thirty-nine miles to the East of Calcutta, where its fury was terrific, and because of our having fortunately been able to obtain through the Logs of two inland Steamers, and the notes of a gentleman residing at a Salt Agency on the verge of the Sunderbunds excellent data for its track there; while farther to the Northward through Jessore and Bogorah into Assam, very good notes also enable us to follow it to its termination, probably into the mountains of Bootan. The Sunderbund documents are by far the most wonderful and interesting accounts of what occurs at the centre of a Cyclone of any yet published, and with the report from Cuttack, copied from the *Bombay Times* go far to establish my theory of the Electric origin of these wonderful meteors.

Beginning with the observations from the Southward, we have the following:

At Madras.

Capt. Biden on the 11th May, in a newspaper notice addressed to the Editor of the *Madras Circulator*, after commenting generally on the uncertain state of the weather at the times of the change of the Monsoon, and the perilous state of the shipping in Madras Roads when gales or Cyclones suddenly set in, says:—

"A severe gust of wind between 2 and 3 A. M. this day from N. W. to N. N. E., with lightning from the N. E. together with an irregular action of the Barometer, shews the necessity of the shipping being well prepared to encounter bad weather; fortunately the sea was smooth, and the Ships and Native Craft held fast, but such a sudden change, and from so suspicious a quarter, should serve as a warning.

* * * * * *

"The Barometer has been very unsteady within the last forty-eight hours, and it fell yesterday from 29° 87′ at 8 A. M., to 29° 76. at 4 P. M., and this morning I learn from the Observatory that the

Barometer is irregular, as it rose a little from midnight to 5 A. M., when it should have been falling, and has been falling ever since, when it should have been rising. We may therefore consider the weather as somewhat suspicious, but the Sea continues remarkably smooth and the surf is moderate; however for the purpose of inducing all due care and precaution I have made the signal—'Weather is suspicious.'"

Ship ENEAS, *Capt.* WRIGHT, *from the Mauritius to Calcutta.*

Wednesday, 11th May, 1852.—Lat. 9° 28′ North; Long. 84° 4′ East; Bar.* 29.89; Symp. 28.80; Aneroid 29.74; Ther. 85°. Wind shifted from S. W., thick squally weather, to W. b. N.; fresh breeze and cloudy to the Westward over the land; at night much lightning, not so much during the day, overcast appearance passing fast to the Northward.

12th.—Lat. 12° 39′ N.; Long. 84° 40′ E.; Bar. 29.85; Symp. 29.80; Aneroid 29.75; Ther. 87°. Wind between West and N. W. W. fresh breeze with a peculiar white overcast appearance, but fine; sun and stars visible at intervals.

13th.—Lat. 15° 38′ N.; Long. 85° 42′ East; Bar. 29.75; Symp. 29.72; Aneroid 29.65: Ther. 87°. Wind variable between W. b. S. and W. N. W. overcast, sun obscured, swell Westerly,† much lightning all round, particularly to S. E. Easterly, and a thick squally appearance in that direction which passed to North, several stars seen during the night.

14th.—Lat. 17° 49′ North; Long. 87° 5′ East; Bar. A. M. 29.62; P. M. 29.55; Symp. 29.66; P M. 29.55; Aneroid A. M. 29.55; P. M. 29.45; Ther. 85°. These observations were taken at 10 A. M. and 10 P. M.; at 9 P. M. felt a short sea from N. Eastward for the first time, scarcely perceptible; the upper dense clouds appeared to move very slow to North or N. b. W. the lower clouds with the wind; stood on our course till 1h. A. M.

15th.—Sea increasing very fast, ship running at nine miles per hour overcast appearance more dense and black, stars seen at intervals, wind between W. b. N. to N. W. variable. Judging from the whole being so steady between W. b. N. and N. W. all the way up from Ceylon, more from W. N. W. than N. W. that the Cyclone was making a Northerly course and my Bar. not being very low, that it was some distance from me, I stood to East Southerly about sixty miles. At 1 A. M. on the 15th, sea increasing very much; during this time much lightning all round, com-

* Observations made at 10 A. M.

† Is this a swell *to* the West or *from* the West?

monly called sheet lightning,* my reasons for standing to Eastward were, in case the Cyclone should recurve and take a course in the direction of the Coast to Ganjam; or otherwise if broken up at the Sandheads I might experience heavy shifts of wind near False Point.

15*th.*—Bar. 29.73; Symp. 29.73; Aneroid 29.63; Ther. 86°; weather-glasses scarcely falling at the usual time. Weather fine, wind between S. W. and South, sea very high from Westward until in soundings, where it entirely disappeared; a very strong haze and high Southerly sea nearly resembling rollers; the haze so strong that I could not see the pilot vessel till close to her, say three miles, (although on board the pilot vessel they had seen us an hour previous). As all hands were anxiously looking out for her, I conclude the haze was much stronger to the Northward than to the Southward.

Abridged Extract from the Log of the Barque LIMEHOUSE, *Capt.* CHESTER, *from the Cape to Calcutta.—Civil Time.*

13*th May,* 1852.—Strong breeze W. N. W. Daylight showery and heavy head swell, ship plunging very deep. Noon Lat. D. R. 16° 42′ N.; Long. 86° 36′ East; Bar. corrected 29.785; Ther. 82°. P. M. wind West, ship running to the Northward. Fresh gales increasing to midnight, when blowing very heavy.

14*th.*—2 A. M. blowing a heavy gale West, and terrific squalls. Hove to. 5 A. M. wind marked S. W.; 6 A. M. bore up, heavy cross seas breaking over the ship like a half-tide rock. Noon Lat. 17° 9′ North; Long. 86° 20′ East; Bar. cor. 29.685; Ther. 82°; Simp. 29.30. P. M. very threatening, making all snug; wind W. S. W. Bar. 29.55; at 7h. 30′; P. M. Ther 80°; 8 P. M. under close reefs; wind West, fresh gale. *The*† *sky in a perfect blaze with lightning all round the compass. At* 9h. 30′ *lightning particularly vivid in the N. W. quarter with rain.* At 8 P. M. sounded; no ground 70 fs.; at 10 P. M. tremendous heavy squalls. Hove to. Wind marked N. West to West; Bar. 29.45; Ther. 79°; Simp. 29.10. Midnight blowing a very heavy gale; wind W. b. S.

15*th.*—Deluge of rain to 2 A. M. Thunder and lightning still heavy. Barometer rising and falling to the weather (extent of variation is not given). At 4 A. M. it suddenly fell nearly calm and in about five minutes it blew a hurricane harder than before. Many clouds full of electricity, sky appearing one mass of fire. Wind S. W.; 8 A. M. S. W. b. W. and

* During the day and night several flashes of forked lightning were observed.

† The italics are mine: this is a notable instance of lightning in the rear of a Cyclone.—H. P.

Noon S. W. Bore up at 8 A. M.; sea very confused and "in eddies." Noon Lat. 17° 59′ North; Long. 87° 22′ East; Bar. 29.83; Ther. 83°: Simp. 29.30. Weather much more settled.

Abridged extract from the Log of the Ship AMAZON, *Captain* COOTE, *from Adelaide to Calcutta—reduced to Civil Time.*

At Noon 12*th May*, 1853.—Lat. 16° 41′ N.; Long. 85° 07′ East; Bar. 29 68; Simp. 29.54; Ther. 88°. Moderate and fine. Wind W. N. W.; at 4, N. W; Sunset threatening. Confused swell getting up. At 8 P. M. Bar. 29.65; Midnight, wind North, fresh and hazy, Bar. 29.65.

13*th*.—A. M. wind N. N. W. gloomy, 4h. the same; Ther. 85°; Symp. 29.40; Bar. 29 57; 6h. moderate breeze from the N. N. W. with dark gloomy weather, making preparations for bad weather; 10h. increasing from the N. N. W. with torrents of rain; close-reefed. Up to Noon strong breezes from the N. W. with thick rainy weather and high tumbling sea, Lat. Acct. 17° 21′ N.; Long. 85° 49′ E.; Ther. 85°; Symp. 29.42; Bar. 29.57; P. M. increasing wind with torrents of rain from W. N. W.; 1h. Ther. 85°; Symp. 29.40; Bar. 29.57. The squalls come on with terrific violence with torrents of rain and confused sea. As we have no doubt but that there is a hurricane to the northward of us and the squalls come with such excessive violence we were afraid of being too near the centre, so keep her away E. S. E. under close-reefed fore and main topsail and reefed foresail. 2h. wind West, squalls terrific (hot and cold like the Scirocco, says Capt. Coote) sometimes the rain would be quite warm and at other times almost freezing; Ther. 82½°; Symp. 29.34; Bar. 29.47; 3h. Ther. 82½°; Symp. 29.30; Bar. 29.40. Wind West, blowing with terrific violence which obliges us to take in the foresail and fore topsail; passed a large Brig, dismasted, lying to on port tack; 4h. wind West, Ther. 83°; Symp 29.30; Bar. 29.40; 5h. Ther. 83°; Symp, 29.30; Bar. 40. Wind W. b. S. blowing dreadfully hard, which obliges us to keep her right before it, but she behaves well and steers beautifully. The sky appears quite red from West to South; 6h. Ther. 83°; Symp. 29.28; Bar. 29.40. Wind W. b. S.; snaked lightning in the N. E., kept away S. E. by S. the wind inclining to Southern. Sea very high and uneven; 7h. Ther. 83°; Symp. 29.31; Bar. 29.44, wind W. S. W. the squalls come with unabated fury; 8h. Ther. 83°; Symp. 29.32; Bar. 29.44. Wind W. S. W. 10h. Ther. 83½; Symp. 29.38; Bar. 29.50. Blowing terrifically, but sea more regular; Midnight Ther. 84°; Symp. 29.56: Bar. 29.48. Wind S. W. in fearful gusts, roaring like thunder. Flash lightning all round the horizon, wore ship and laid to with head to the Northward.

14*th.*—Up to 4 A. M. a heavy gale from the S. W. with fearful sea; Ther. 85½°; Symp. 29.40; Bar. 29.51. At 6 A. M. more moderate, wind S. W. very red appearance in the Eastward; 7h. a terrific squall coming up *which appears like a cloud of brick-dust.* Took in fore topsail. But before we could get the main topsail in it was up to us, and with such terrific violence that we were obliged to keep her right before it, as if it had struck her on the broad side nothing could have saved her. Managed to get the main topsail in. When right before the squall her masts bent like willows. In fact I thought nothing could have saved them. It blew with terrific violence until 10, when it moderated a little, but the wind is still West up to Noon, strong squalls with constant rain. Sea very much confused with snaked lightning in the East. Lat. 17° 00′; by 2 Alt. 16° 50′ N.; Long. 87° 13′ East by Chr.; Ther. 82°; Symp. 29.56; Bar. 29.64. P. M. heavy squalls, wind W. S. W. kept her away N. E. under easy sail; 4h. squalls very much diminished, wind S. W. *I counted thirteen whirlwinds all in sight at one time and as high as my main mainmast. There was one passed close to me and it left a very troubled wake. They appeared to blow with terrific violence.*

Ship FAIRFIELD *of Liverpool, Capt.* HORNELL, *towards Calcutta.*

13*th May.*—Noon Lat. 11.39. Strong breeze and gloomy weather from S. W. and N. W. Ship standing to N. b. W. and N. N. W.

14*th May,* 1852.—Noon Lat. 15.08; fresh breeze S. W. and cloudy weather with much lightning. Ship standing to N. N. W.

15*th May.*—Gloomy weather and steady strong breezes from S. W. 5 P. M. Ganjam Flag Staff N. W. b. W. 8 miles. Ship running along shore from 6 P. M.

Abridged Extract from the Log of the Ship "LONDON," *Capt.* H. O'NEILL, *from Akyab to London—reduced to Civil Time.*

This unfortunate ship left Akyab bound to London with a cargo of rice on the 8th May, and on the 11th at Noon she was in Lat. 18° 12′. N. Long. 91° 28′ East, with S. S. W. and S. W. winds; and on the 12*th May,* A. M. had fresh breezes and squally weather from W. S. W. to S. E. and N. East. Ship steering to the S. W. being at Noon in Lat. 16° 40′ N.; Long. 90° 00′ East, going 8½ knots. Wind and sea increasing rapidly from Noon. Wind marked N. East at 4 P. M. and North at 11.6 P. M. Heavy gale with violent squalls of wind, rain, *thunder and lightning.** Tremendous sea rising and ship making bad weather. Hove to

* Italics are mine.—H. P.

on larboard tack; wind veering to the Northward and N. W. Barometer steady on the 10th, 11th and 12th, at 29.48, but when the hurricane commenced, it fell gradually to 28.50, and stood at that point for four hours. At 10h. 30′ P. M. a complete hurricane to midnight.

13th May.—At 2h. 30′ A. M. lost mizen mast and head of main mast; wreck of the mizen mast getting under the ship's bottom; 4 A. M. Wind marked N. W. and at 9 A. M. West. Cut away the main mast *which disabled one pump and injured another.** At 11 A. M. Wind is marked W. S. W. Hurricane still continuing and the ship in the utmost distress; P. M Rudder head split; 2 P. M. Pumps choked with rice. Throwing cargo overboard. Found channel bolts and planks started and rent. Hurricane to midnight.

14th May.—4 A. M. more moderate, cargo heating and steaming, rudder useless; 10 feet water in the hold and excessively hot. Noon Lat. D. R. 16° 41′ N.; Long. 89° 40′ East. Crew unable to stand the heat of the water and steam.

16th May.—Ship settling fast, pumps choked, and crew completely exhausted. At 3.38 P. M. abandoned the ship in the longboat. Lat. at Noon 17° 35′ North; Long. 90° 40′ East. Fresh breezes from S. W.

Abridged Extracts from the Log of the ADELAIDE, *Capt.* STEPHENS, *from Adelaide to Calcutta—Civil Time.*

13th May, 1852.—A. M. Calm. At 10, increasing breeze and a head swell on, ship standing E. b. N. Wind marked North. Noon Lat. 19° 27′ N.; Long. 86° 15′ East. 2 P. M. stormy, wind increasing to a gale with heavy swell from the Eastward; 6 P. M. severe gale; close reefs. Increasing sea as before; 8, heavy gale and stormy gusts; 8 P M. made all snug and put the helm up to run out of the limits of the hurricane. At 10, Wind N. N. W. and at Midnight N. W. b. W. Running to S. b. E. to Midnight. Barometer and Sympiesometer as follows:

Bar. Symp. and Ther. May 13th, 1852.

	Bar.	Symp.	Ther. A. M.
12*h*	29.57	29.25	86°
1 P. M.	00.00	00.00	0
2	29.50	29.17	85
3	29.47	29.15	85
4	29.45	29.12	85
5	29.38	29.12	85
6	29.44	29.10	85

* The liability to this accident I have already pointed out elsewhere, but it cannot be too often urged upon owners, builders, and seamen.—H. P.

7	29.38	29.10	85
8	29.40	29.10	85
9	29.38	29.05	85
10	29.43	29.10	85
11	29.45	29.10	84
12	29.39	29.10	84

Although there appears to be a great variation in the readings of the Barometer, it is perfectly correct, as I was particular in taking it myself every hour of the gale.

D. H. Stephens.

May 14th.—A. M. wind N. W. b. W. Tremendous heavy gale; running under close-reefed main topsail and fore-topmast staysail. At 4 A. M. having run 48 miles to the S. b. E., S. E. b. S. and S. East, hove to with wind at N. W.; 5 A. M. wind W. N. W.; 9 A. M. West Noon Lat. 18° 45′ N.; Long. 87° 23′ East. P. M. hard gale; midnight hard gale with a great deal of lightning and thunder.

Table of the Instruments and Remarks for the 14th May.

	Bar.	Symp.	Ther.	Remarks 14th of May.
1 A. M.	29.34	29.2	83	Heavy gale, A. M.
2	29.32	29.5	81	
3	29.28	29.2	80	
4	29.12	28.97	80	
5	29.15	29.2	81	
6	29.27	29.7	81	
7	29.28	29.10	81	
8	29.32	29.12	81	
9	29.37	29.15	81	
10	29.37	29.15	81	
11	29.30	29.5	81	
12 Noon	29.34	29.00	81	
1	29.38	29.5	81	
2	29.40	29.10	82	
3	..	..	..	
4	..	..	..	
5	..	..	..	
6	..	..	..	
7	29.41	29.12	83	
8	29.47	29.20	84	
9	29.48	29.22	83	
10	..	..	..	
11	..	..	..	
12	29.48	29.25	83	

As the wind shifted in much more curious and greater regularity than is marked in the ship's Log, which was not written up till noon of this day, and being on deck myself, with the exception of a few minutes each hour, to note my glasses and make my remarks, I give a short statement of the actual winds and courses 9 P. M. 13th until 4 A. M. 14th.

	Wind.	*Course.*
9 to 10 P. M. 13th	N. b. E.	S. b. W. hard gale.
11	North.	South ditto ditto and heavy rain.
12	N. b. W.	S. b. East heavy gust with moderate rain at 4, hove to on Port tack.
1 A. M. 14th	N. N. W.	S. S. East ditto with much lightning to the N. W.
2	N. W. b. W.	S. E. b. S. ditto ditto ditto.
3	N. West.	S. East.
4	N. W. b. W.	S. E. b. E.

15*th May.*—Wind S. W. and decreasing gale to Noon when stormy breeze and clear. Lat. 19° 27′ N.; Long. Acct. 87° 12′ East. Bar. at 8 A. M. 29.50; Noon 29.58. A set of 40 miles to the W. b. N. from Noon of the 13th, supposed to be occasioned by the Cyclone.

Abridged Extract from the Log of the P. and O. Steam Ship PRECURSOR, *Capt.* A. GRIFFIN—*Civil Time.*

13*th May,* 1852.—A. M. moderate breezes with occasional heavy squalls from the Southward, weather looking unsettled. Noon Lat. 15° 28′; Long. 83° 01′; 6 P. M. Bar. 29.68; Symp. 29.48; Ther. 88°. Heavy dull-looking weather with leaden appearance. Wind falling light and hauling round to the Northward and N. Eastward. Not liking the look of the weather, took in and furled all sail, made preparations for bad weather by securing every thing on deck with extra lashings, &c. Slight swell from Northward, 7.30 P. M. Bar. 29.74; Symp. 29.44; Aneroid 29.64; Ther. 87°. Gloomy looking weather, a few stars visible to the Eastward and Westward. Wind very light from N. Eastward, every thing snug before night.

9.30 P. M. Bar. 29.74; Symp. 29.48; Aneroid 29.67; Ther. 85°. Moderate Easterly breeze, weather looking much clearer. Stars bright overhead, and to within 16 or 18 of the horizon, where they were obscured by a bank.

11 P. M. Bar. 29.70; Symp. 29.55; Aneroid 29.65; Ther. 84°. Clear overhead, hazy about the horizon. Wind moderate from S. Eastward. Stars steadily bright. Steering to the N. Eastward.

14*th May.*—3 A. M. Bar. 29.65; Symp. 29.50; Aneroid 29.56; Ther. 87°. Light breeze from N. Eastward. A head swell rising. Very squally appearance from North to E. N. E. with lightning. Stars visible to the Southward. Steering to the N. Eastward.

4 A. M. Bar. 29.63; Symp. 29.45; Aneroid 29.56; Ther. 87°. Squally dark appearance from N. W. to S. E. by the North with heavy increasing swell from N. Eastward, thunder and lightning. Rigged in the jibboom and housed the fore-topmast. Wind very light and variable. *Reduced our speed to about 4½ knots, to avoid running into bad weather, which I felt sure existed to the Northward.**

5 A. M. Bar. 29.63; Symp. 29.50; Aneroid 29.57; Ther. 88°. Shortly after 4, a light breeze sprung up from S. W. which lasted for about an hour. Wind now very light and variable. A heavy bank forming to the Northward. Lightning very low, but not very vivid. Swell very heavy and increasing from N Eastward. Engines going very slow. Steering N. E.

6.30 A. M. Bar. 29.65; Symp. 29.45; Aneroid 29.58; Ther. 84°. Wind light from Northward, detached clouds overhead with no apparent motion. Heavy appearance all round the horizon particularly to the Southward. A very heavy sluggish swell from N. E. Steering E. N. E. and going quite slow.

8 A. M. Bar. 29.69; Symp. 29.57; Aneroid 29.66; Ther. 84°. Light N. Easterly airs. Swell still from N. E., if any thing, decreasing, sky more uniformly dark, but not looking so threatening. Steering N. E.

9.30 A. M. Bar. 29.74; Symp. 29.60; Aneroid 29.63; Ther. 85°. Moderate wind from S. Westward. Clouds appear more broken. N. Easterly swell very high, and toppling over to the Northward. Went on again full speed. Steering N. E. Saw a Paria sloop to the N. Westward. standing to the Eastward under all sail.

10.30 A. M. Bar. 29.70; Symp. 29.58; Aneroid 29.63; Ther. 85°. Moderate S. Westerly winds with detached clouds, weather altogether appearing much finer. N. Easterly swell still very heavy, but regular; ship diving deeply at times. Wind rather inclining to the Southward.

Noon. Bar. 29.65; Symp. 29.50; Aneroid 29.57; Ther. 87°. Moderate S. Westerly wind and much clearer weather. Very heavy N. Easterly swell toppling over to the Northward. Sun visible at times Lat. 17° 46′ N.; Long. Acct. 84° 48′ E. The ship pitching heavily.

3.30 P. M. Bar. 29.63; Symp. 29.45; Aneroid 29.55; Ther. 86°. Since 1 P. M. moderate Westerly breeze and cloudy thick weather. Heavy swell from N. E. not so regular, light rain.

7 P. M. squall of rain from N. West with lightning.

7.30 P. M. ditto ditto ditto.

8 P. M. Bar. 29.65; Symp. 29 50; Aneroid 29.63; Ther. 87°. Dark clouds passing over from N. W. Dark threatening appearance to the S.

* Italics are mine.—H. P.

Eastward. Vivid lightning to the Northward and Southward. Wind light from Northward and Westward. Swell rather decreasing. Ship pitching very heavily, occasionally a few stars visible. Steering N. E. by N. got a glimpse of the planet Venus, which gave us a Longitude 86° 30′. This worked back to Noon, gives a set to the Eastward of 65 miles from the previous Noon!

9 P. M. Bar. 29.70; Symp. 29.54; Aneroid 29.64; Ther. 85°. A tremendous squall struck us from the N. W. with heavy rain. It veered to West and S. W. blowing very hard, lightning very vivid, and sky all round as black as ink. Thinking it possible *that this might be the first breeze of a Cyclone, I put the ship's head to the Southward and reduced speed to about 6 knots.** Observed a small meteor playing about the main top-gallant mast head which disappeared in a few minutes.

10 P. M. Bar. 29.70; Symp. 29.54; Aneroid 29.64; Ther. 85°. Dark threatening appearance. Wind moderating at S. W. Midnight very vivid lightning to the Southward with black threatening appearance. Wind from S. W. and S. S. W. blowing a fresh gale at times with rain. Barometers, &c. pretty stationary, still steering South and going slow.

15*th May.*—A. M. Bar. 29.70; Symp. 29.60; Aneroid 29.63; Ther. 84°. Dark angry appearance all round. Strong S. S. Westerly wind with rain, much less sea and swell, lightning less vivid. Put the ship's head round to N. Eastward again, going quite slow.

6 A. M. Bar. 29.71; Symp. 29.63; Aneroid 29.65; Ther. 85°. Gloomy looking weather with moderate S. Westerly breeze. Swell moderate from S. Eastward. Weather appearing more settled. Went on full speed for the Pilot's Ridge Station.

8, Bar. 29.68; Symp. 29.61; Aneroid .29; Ther. 84°. Noon Bar. 29.75; Symp. 29.62; Ther. 86°. Lat. 19° 31′ N.; Long. 87° 10′; Pilot's Ridge Station N. 12° E. 84′.

American Ship Angelo.

This ship was on the 12th May, in Lat. 13° 37′ North; Long. 82° 3′ East, and on the 15th, in 18° 39′ North; Long. 86° 2′ East with variable winds from W. to S. East and S. W. a long heavy S. W. swell all day, is the only remark on the 15th, and this continues on the 16th. The Captain observed very threatening appearances to the N. East on the 14th, when in Lat. 17° 12′ North; 84° 10′ East; (Bar. fallen to 29.65 from 29.80 on the 13th,) but the sickness on board prevented him from making notes.

* Italics are mine.—H. P.

Report from Mr. W. Barckley, *Superintendant of False Point Light House.*

On the 13*th and* 14*th May*, 1852.—False Point was visited with a heavy gale. On Thursday the 13th, at 2 p. m. we had a heavy squall from the N. E. the wind being in the forenoon from East; it continued squally with a low cross scud, one from the S. E. and another from S. W. with a falling Barometer until midnight, with the wind from North; when it settled in a steady gale from N. W. with heavy rain, and distant thunder, but no lightning, the gale continued steady from N. W. until Noon of Friday the 14th, when the wind changed to North, and at 5 p. m. veered round to S. E. At 6 p. m. the gale broke with the wind at S. S. E. the Barometer was at its lowest at 5 p. m. when it stood at 29 38. After that the Barometer was on the rise. There seemed to be a confused sea on, out to sea-ward, and a very heavy break upon the beach. I am happy to say there was no damage sustained at or near the Light House during the gale.

I have the honour to enclose a Statement of the Barometer during the gale.

State of Barometer and Thermometer, on the 13*th and* 14*th May*, 1852, *at the Light House on False Point Palmiras.*

May 13th.

Hours.	Barometer.	Thermometer.	Wind.
8 a. m.	29.70	84.0	East.
10 ,,	..	85.0	,,
Noon.	..	86.0	N. E.
2 p. m.	29.65	..	,,
4 ,,	29.62	..	,,
5 ,,	29.60	85.0	North.
6 ,,	29.60	84.0	,,
8 ,,	29.55	83.0	,,
Midnight.	29.55	82.0	N. W.

May 14th.

2 a. m.	29.52	80.0	N. W.
4 ,,	29.50	..	,,
6 ,,	..	81.0	,,
8 ,,	..	82.30	,,
10 ,,	..	84.0	,,
Noon.	..	..	North.
2 p. m.	29.45	..	,,
4 ,,	29.40	83.0	,,
5 ,,	29.38	..	S. E.
6 ,,	29.40	82.0	S. S. E.
8 ,,	29.45	80.0	,,
Midnight.	29.50	80.0	West.

Station of CUTTACK; *Extract from the Bombay Times.*

"*Cuttack, 9th June,* 1852.—I see by the "Bombay Times" that there has been very extraordinary weather throughout almost the whole of India. I can say for Cuttack this year that it has been the same here, and every person who has known the place for some time, remarks that it was quite unusual. We have had constant thunder-storms, attended with frequent and heavy rains, and the Barometer has been constantly oscillating, thus showing frequent breaks and irregularities in the upper currents. The wind has always had a great deal of southing in it, and has influenced the weather as to moistness accordingly. Damp hot winds like those from a vapour-bath have been very prevalent, and tatties and cooling the air are quite out of the question whilst these hold sway. The vapour percentage for March, an unusually dry month generally speaking, was as high this one as 64. We had consequently many days on which there were thunder-storms, attended sometimes with slight, but frequently with very heavy rain; the wind held firmly to the S. and S. S. W. quarter, and the air was humid in the extreme. In April the air was drier, the vapour percentage fell to 55, but in it there were many days of rain, although it was never so heavy as in the last month. The winds were Southward before. In May the vapour percentage for the first 10 days was 67.7. Mean of the Barometer, corrected for Temperature, and surface of Mercury in tube, but not for level, 29.584; Mean of Thermometer 87.9; and rain in inches 1.83. For the second ten days, the vapour percentage reached 70, Mean of Barometer 29.543, of Thermometer, in N. N. E. verandah well protected from radiation 87.6. For the whole month, Mean of Barometer 29.585, Thermometer 88.9, Dew-point 74.1, Vapour percentage 62, rain in inches 3.25. The winds were S. W. 57, West 2, South 18, S. East 21, North 2, N. East 21, N. West 14, East 1, total 136. I mean by S. W. all winds that blow between the points of S. and West. Thus giving 43 of East winds, 73 of West winds, 37 of North winds, 96 of South. North winds are to South as 1 to 2.59, East to West as 1 to 1.6. The South being by far the most prevalent, may account for the extreme dampness of the air, in this month, as also the formation of the Coast at Pooree where all winds between S. W. and E. S. E. are from the sea, and damp. The Barometer was affected here by the Cyclone which raged so furiously at Calcutta on the 14th and 15th May last. The atmosphere was much disturbed, and the whole lower currents of air underwent a complete change, although the wind from the Cyclone itself did not reach us in any strength. The sky was overcast with drizzling rain until 4 P. M., *and there was a most lurid and*

threatening appearance in the sky to the East and E. N. E. during the whole day. The Cyclone was evidently travelling up to N. N. W., and Calcutta would be nearest its centre, when the wind came about N. by E., when it must have raged furiously. The Barometer stood thus here: Sunrise 29.420; 9 h. 50 m. A. M. 29.437; at Noon, 29.393; at 2 P. M. 29.371; at 4 A. M. 27.349, at which time it was at its lowest ebb, and from which it gradually came round again to its accustomed height. The wind was thus: sunrise N. by E.; 9 h. 50 m. A. M. N. N. W.; Noon N. W.; 2 P. M. W. N. W.; 4 P. M. W. by N.; when from that time, it came round to S. of W., thus making a half circle round the compass in the 24 hours. We had a very heavy thunderstorm here yesterday, in which I remarked a curious phenomenon, which I never observed before. The Barometer fell in the violent gusts of wind, and they *were* violent as you may suppose when I tell you that trees of three feet in diameter were broken in two at their lower and strongest part, and great branches of mango trees in a tope not far distant, were torn off, and thrown to a distance from their stem, and the rain, which came down actually in sheets of water, was forced through the venetians into my room although they were closed and fastened at the time, and fell in a shower of spray on the middle of the floor, wetting everything; the woodwork of the venetians was wetted outside and inside at once, and simultaneously, and in sheets along the wood, as if the rain had violently driven through its pores—the venetians all the time never opened in the least, for I watched them particularly. I also, when going outside to see the lightning, which was so vivid as to make the deep darkness caused by the storm at once lighten into the brightness of the day, so instantaneous and without intermission, that flash followed flash, and peal upon peal, without a moment's pause, was driven forcibly against the wall, and held there for some moments by a pressure that I could not overcome with all my strength, and was quite exhausted when I got inside. As I was saying, the Barometer fell in the gusts to the 1-10th of an inch, and rose as suddenly to within the same space. The Thermometer did the same, and it was curious and beautiful to see how they came together at once without any pause between them: twice they fell to two-tenths of an inch, and three times to the one-twentieth, during the extreme violence of the wind, which was as strong at the time as any hurricane, but fortunately only lasted for half an hour with this extreme fury. The thunder was ushered in by four peals which fell on the ear like cannon, with an astounding crash, and the flash that followed was so white and dazzling that it quite overpowered the light for a moment, and set one blinking like an owl

when it comes to daylight. None of the other peals, save these four, were near. The lightning that came before them was all of a dark red, showing the storm evidently high up, as taking place in highly rarified air. *What was curious to observe was, that the wind was very violent before the lightning began, that when the latter was in great force and flow, the wind lulled a little, but that when there was an interval between the flashes, the wind again renewed its force with redoubled fury, proving the electric origin of the wind, as, had it not been neutralised by the flashes it would have come on as a Cyclone.* The Barometer also fell after a strong flash of lightning, equally as with a violent gust of wind, showing that in which shape soever the disturbance was neutralized, with that shape it was contented and would rise. The storm also was very violent at particular places, and limbs of trees were wrenched round and torn off in some, whilst in others they were not touched. The Barometer fell at the beginning of the storm, thus showing that it was to be a very strong one. I have never remarked it to do so in any storm before, and I always watch it invariably rising as the storm approaches. I never before observed it fall. The thatch of many of our houses was blown off, and strewed the road and gardens for some distance around. *I myself distinctly heard a peculiar noise in the wind, not that as if it echoed from the building and walls, as I heard it outside in the verandah, but a screaming kind of noise, such is described to take place in Cyclones.* I may say that though this place is noted for thunderstorms, and though they are very violent, and that we have had many since our arrival, I have never seen anything that came up to the violence of the present one, both for violent gusts of wind, and quickness, and vividness of the flashes of lightning,—but I have said enough about storms."—*Bombay Times, July* 7.

Report from Balasore, by A. Bond, *Esq. Master Attendant.*

On the 12th and 13th instant, two days prior to the gale, there was a great closeness in the atmosphere, Thermometer being at Noon 92°, light breeze from the S. E. with a gathering of heavy clouds from E. S. E. to E. N. E. indicating wind and rain. During the gale at 5 P. M. of the 14th, there appeared to the *E. N. E. a heavy bank of clouds shewing a storm at that point, whilst we had the wind here at N. N. W.* with a stiff breeze which a ship could carry single-reefed topsails with. The weather was similar to the N. N. E. and S. W., and close up to Kontai (Hidgellee) it was not much stronger than here, no houses having been blown down.

BALASORE.

State of the weather on the 14*th May*, 1852.

13*th May.*—Bar. 29.58. Wind S. E. with slight rain; cloudy to the E. S. E. and E. N. E.: Noon Ther. 92°.

14*th*—Bar. 29.58; at 6 A. M. light breeze, wind N. E. and very cloudy, Ther. 88°; at 10 A. M. Bar. 29.48. Weather cloudy and threatening with a very light shower from the N. N. E.; Noon Bar. 29.45, breeze increasing from North to N. N. W. with smart showers of rain, Ther. 86°; at 2 P. M. Bar. 29.36 with heavy rain from the Northward, and a dense cloud hanging to the E. N. E. shewing a gale there. At 5 P. M. Bar. 29.29; Ther. 84°, heavy rain with strong gusts of wind, the dark bank still remaining to the E. N. E. whilst the wind here is shifting more westerly, wind N. N. W.; at 6 P. M. Bar. 29.29; Ther. 84°, wind N. W.; at 7 P. M. and puffy and the Bar. and Ther. remained at that height till Midnight when the Bar. rose to 29.33, and the wind decreased; it having got round to W. N. W. and W. S. W.

15*th.*—Bar. 29.58; Ther. 83; at 6 A. M. wind S. W. fine breeze and pleasant weather, but still cloudy.

Report (as published in the newspapers) of the foundering of the ship DUBLIN, *Capt.* ROBINSON, *from Calcutta bound to London.*

This ship was left by her Pilot on the morning of Thursday the 13th May, 1852, and with the wind at E. N. E. she unfortunately committed the old error of standing close hauled to the S. Eastward instead of bearing up, which would have brought her quickly on the Western and S. Western quadrants of the storm. After standing on, she finally hove to so as to wait for the centre to come up to her. The following is abridged from the newspaper account.

"The commander of the *Dublin* and part of her crew have reached at Contai or Hidgellee, near Balasore. The following statement has been sent to Calcutta by Captain Robinson:—

Contai, 19*th May*, 1852.—I was compelled to abandon the *Dublin* on Saturday morning, she having then nine feet water in her and fast settling down.

The pilot left me on Thursday morning, the wind drawing from the eastward and beginning to puff up; at Noon double reefed the topsails. I carried on a press of canvas to get to the Southward. At 4 P. M. close reefed the topsails. Wind E. N. E. At 6 P. M. stowed the foresail, at 10 P. M. blowing with fearful violence stowed fore-topsail and hove her too under

close-reefed main topsail, her head to the S. S. E. Midnight blowing very hard with small rain at times. At 4 A. M Friday, Barometer falling; 8, wore ship to the N. Westward, expecting by Piddington's Law of Storms that the centre bore S. S. E. from me, and by having my ship's head to the Northward, I should be able to come up to the wind as it shifted and prevent my vessel being taken aback. Lashed hammocks in the mizen rigging. At 10 A. M. Barometer still falling down to 28.30, blowing a terrific hurricane, all my bulwarks gone, the cabin doors and front of the poop stove in and the sea washing over us. All hands lashed to the pumps. I got the carpenter's axe ready to cut the lee rigging, as I expected to see the masts go over every minute. Noon, blowing still harder with dreadful rain and almost as dark as night. At 4 P. M. Barometer still falling, down to 28. The hurricane at its extreme violence, and the rain was dreadful. I was lashed close to the man at the wheel. I became quite deaf with the quantity of rain and sea that was going down my ears. At 6 P. M. Barometer rising, wind shifting to the Northward. At 7 P. M. wind N. W. hurricane still blowing very hard with a fearful cross sea on. At 8 P. M. set the goose wings of the foresail and got the ship before the sea to the Southward. At midnight wind abating fast, all hands still at the pumps, when the crew were completely done up and said the vessel was sinking; could not sound the pumps on account of the repeated heavy seas washing fore and aft. Daylight sounded the well and found eight feet water in her, her paint streak completely in and her stern windows not far from the water. I saw I had no time to lose. I asked the crew to stick to the pumps; they said they could not. I called to them and said "then the only chance that remains is to take to the boats, and it shall be that the starboard watch takes the starboard boat, and the larboard watch the port boat. I will not pick any one." One boat only reached the shore about Pipley."

Abridged Report from the H. C. F. Light Vessel STAR, *Eastern Channel Station Lat.* 21° 4′ *N. Long.* 88° 14′ *East.*

The H. C. F. L. Vessel "*Star*" experienced a very heavy gale of wind on the 14th. It commenced on the 13th in the afternoon from E. by N. gradually increasing, and on the 14th it blew a perfect hurricane with a tremendous sea running. Vessel pitching and labouring very much and shipping great quantities of water over all; at midnight the wind gradually veered round to N. W. with very heavy squalls and gusts of wind with a frightful sea running. On the 15th at 2 A. M. the gale abated and the wind veered round to West.

On the 14th October, 1852.—At 11 A. M. observed the vessel take a great sheer to E. S. E. perceived that the cable had parted 20 fathoms from the hawse (the vessel at the time riding with 190 fathoms) immediately let go the starboard anchor and whilst veering out cable, it parted at 60 fathoms; cleared away the larboard waist anchor, which had the chain bent on, immediately let it go and veered out to 70 fathoms, but still finding the vessel driving in a Westerly direction immediately got the starboard cable aft to the starboard waist anchor and clinched it, which no sooner done, then it was let go and veered out to 130 fathoms, which apparently brought the vessel up. At 6 P. M. the vessel took a tremendous roll and filled the starboard quarter-boat; it blowing then a perfect hurricane and a frightful sea running, cut it away to save the mizen mast and port quarter boat, Barometer down to 28.36.

15th.—A. M. blowing a hurricane from N. W.; at 1 A. M., in a tremendous squall parted the starboard cable at 130 fathoms; wind veered round to West when the gale abated, the vessel then having the chain anchor down; found we were in 25 fathoms of water from 10 to 12 miles W. S. W. of the station. In consequence of the heavy sea running, it was not practicable to heave the anchor up for fear of parting the chain, at Noon Lat. by Obs. 20° 55′ North.

The vessel has sustained no damage as regards her hull, masts or rigging.

16th.—At Noon hove up, made all sail to regain our station, which we reached at 6.30 P. M. and showed the usual station light.

Abridged Report from the H. C. P. V. CAVERY, *commanded by* MR. R. HAND, *B. P. Pilot's Ridge Station.*

On the 14th inst. at 6.30 A. M. the vessel parted, riding with 150 fs. of cable on the Eastern edge of the Pilot's Ridge in 24 fs. water, 3 miles E. by N. of the Pilot's Ridge light vessel.* 7 A. M. set the close reefed main topsail, reefed foresail and fore topmast staysail; wind N. E. steered down S. S. E. to stretch out clear of danger, after which I intended to lay to on the starboard tack. As I went to the Southward, wind came more North about, I then thought there was a chance of running clear of the hardest part, by continuing on my Southern course. At 10.30 A. M. furled foresail, and main topsail. It now became actually requisite for the safety of the vessel to keep her before the wind and sea, and to accomplish this it was evident that the mainmast must be cut away, not having succeeded in cutting away the main topmast; this was done, and the vessel became more easy, and steered with evident ease before the wind, and as the wind veered to the Westward the vessel's head came round to the Eastward the lowest range of the Barometer being 28.64.

* Lat. 20° 49′ N. Long. 70 46′ E.

Abridged Copy of the Log of the H. C. P. V. Cavery, *Friday*, 14*th May*, 1852.

A. M. fresh gales from N. E. to E. and heavy sea.

4 A. M. a heavy squall from E. N. E.

5 A. M. dirty appearance, fresh squalls from E. N. E. with rain. Ridge F. L. Vessel W. by S.; too thick to see the *Tavoy*.

6.30 A. M. parted and stood down S. S. E. under a close-reefed main topsail and reefed foresail, wind increasing and sea rising fast; each successive squall striking the vessel with increased fury, burying her at times completely under water.

About 10.30 A. M, clued up the foresail and main topsail, and with some difficulty furled them, wind from N. N. W. to N. W. steering from S. S. E. to S. E. by E.

About Noon the vessel broached to against her helm, bringing her broadside on to a terrific sea, which broke over her fore and aft; Barometer at this time commenced to fall with fearful rapidity, the wind and sea increasing every minute, the squalls bringing the vessel to leeward as far as the fair leaders of the lower rigging; endeavoured to get her before the wind (which at this time was oscillating between N. W. and N. N. W.) by hoisting the foretop mast staysail which had been bent afresh, but it blew clean away in the attempt. Having lost all management of the vessel from her being under water to leeward, and the sea breaking with tremendous force over her (washing overboard hen-coops, &c.) tried to cut away the main topmast to get her before the wind, but the mast would not go, and the position of the vessel being momentarily more perilous, it was resolved to cut away the mainmast which was done forthwith, between 1 and 2 P. M. the wreck was cleared as soon as practicable and the vessel paid off before the wind, much water continually on her decks, the scuppers not being sufficient to carry it off; it is supposed that during this time the carpenter was washed over-board, he having been last seen so employed. At about 2.30 P. M. the Barometer commenced to rise and the strength of the hurricane abated, when the wind oscillated from N. W. to W. and at 8 P. M. was W. N. W.; from this time the weather rapidly cleared, the Barometer rising as fast as it fell; at about 11.30 P. M. set the fore topsail double reefed and hove her to on the port tack, wind at West and sea fast decreasing.

Register of Barometer, 14*th May*, 1852, *H. C. P. V.* Cavery.

2	A. M.	29.54	Squally appearance E. N. E.
4	„	29.54	Heavy squall from W.

6	A. M.	29.48	Passing squalls and rain.
7	,,	29.44	,,
8	,,	29.43	The same N. E.
9	,,	29.42	,,
10	,,	29.37	N. N. E.
10.15	,,	29.30	Heavy squalls from N. to N. N. E.
10.30	,,	29.25	N. to N. N. W.
11	,,	29.20	Tremendous ditto ditto N. N. W. to N. W.
11.40	,,	29.65	,,
Noon	,,	29.5	,,
12.15	P. M.	29.0	,,
12.30	,,	28.90	,,
12.45	,,	28.85	,,
1	,,	28.78	,,
1 30	,,	28.64	Terrific from N. N. W.
1.45	,,	28.64	,,
2	,,	28.64	,,
2.30	,,	28.70	,,
2.45	,,	28.77	,,
3.15	,,	28.80	,,
4	,,	28.90	Not in such quick succession.
5	,,	29.0	N. W. to W.
5.30	,,	29.4	,,
6.15	,,	29.10	More moderate W. S. W.
7	,,	29.25	,,
8	,,	29.40	,,
10	,,	29.45	S. W.
Mid.		29.50	,,

(Signed) R. Hand, B. P.

Abridged Report from the H. C. P. V. Salween, Mr. J. W. Roberts, *B. P. South Channel.*

At 2 P. M. *on May* 13*th.*—I had anchored in 12 fms. water in the South Channel, having been driven there by a fresh Easterly breeze, while taking the pilots from the outward bound ships. The South Channel Buoy bore about W. ½ N. 3 miles and after veering to 75 fms. and sending down the top gallant yards and masts, I considered it expedient about 7.30 P. M. to veer to 145 fms. of cable as there was a chopping sea. The cable was quite new, but at midnight the vessel had parted at about 130 fms. Hove the remainder of the cable in and stood to S. E. by S. Wind fresh from

E. N. E. under double reefed topsails and reefed courses. At daylight of the 14th of May: more gusty, close reefed the topsails and about 8.30 A. M. we were under bare poles on the port tack. The wind N. E. and the sea increasing. The squalls at last became so furious and the sea of course so heavy, that as the vessel lay over, the upper dead eyes of the lower rigging on the starboard side were frequently awash.

The centre of the Cyclone passed to the Westward of us about 3.30 P. M. and at 6.30 P. M. having gradually come up on the port tack from S. E. at 8 A. M. to North, we wore to the Southward; the wind being of course West and by midnight the gale was over.

Hours.	Bar.	Ther.	Wind.	Force of Wind.
		MAY 12TH, 1852.		
10 A. M.	29.81	85	S. E. to E. S. E.	2
Noon.	29.75	85	,,	3
4 P. M.	29.75	85	,,	2
8 ,,	29.79	85	,,	2
Midnight	29.79	85	E. S. E.	2
		MAY 13TH, 1852.		
4 A. M.	29.69	85	East to E. N. E.	3
8 ,,	29.73	86	,,	4
10 ,,	29.72	85	East.	6
Noon	29.69	85	East to E. N. E.	5
4 P. M.	29 61	85	E. N. E.	6
8 ,,	29.60	85	E. N. E. to N. E.	6
Midnight	29.56	85	E. N. E. to East,	6
		MAY 14TH, 1852.		
2 A. M.	29.32	85	N. E. to E. N. E.	7
3 ,,	29.48	85	,,	7
4 ,,	29.45	85	N. E. by E.	8
5 ,,	29.40	85	N. E.	9
6 ,,	29.35	85	,,	9
7 ,,	29.31	85	,,	9
7.30 ,,	29.34	85	,,	9
8 ,,	29.30	85	,,	10
8.30 ,,	29.29	85	,,	11
8 ,,	29.25	85	,,	11
10 ,,	29.20	85	,,	11
11 ,,	29.22	85	N. N. E.	12
11.30 ,,	28.95	85	,,	12
Noon	28.86	85	,,	12

1 P. M.	28.86	85	N. by E.	12
2 „	28.80	85	N. by W.	12
2.30 „	28.80	85	N. N. W.	12
3 „	28.75	85	N. W.	12
3.30 „	28.72	85	„	12
4 „	28.80	85	W. N. W.	12
5 „	28.85	85	W. by N.	11
5.30 „	28.95	85	West.	11
6 „	29.01	85	„	11
6.30 „	29.05	85	„	11
7 „	29.10	85	W. by S.	11
8 „	29.21	85	W. S. W.	10
9 „	29.32	85	„	10
10 „	29.45	85	„	9
11 „	29.45	85	„	9
12 „	29.50	85	W. S. W.	9
		MAY 15TH, 1852.		
2 A. M.	29.55	85	S. W. b. N.	8
4 „	29.55	85	„	8
5 „	29.60	85	„	8
6 „	29.60	84	W. S. W.	7
8 „	29.65	84	„	7
10 „	29.68	85	„	7
Noon	29 70	85	„	7
4 P. M.	29.65	85	S. W.	6
8 „	29.70	85	„	6
Midnight	29.72	85	„	6

Abridged Report from the Log of the Barque EASURAIN *from Mr. Mate Pilot* G. B. YOUNG.

At daylight on the 13th May, 1852, we weighed from Cowcolly Roads with a N. E. wind and fine weather, and proceeded down Lloyd's Channel; at 8 A. M. wind veering to E. N. E. anchored by Saugor Flat Buoy, with it bearing E. S. E. ½ a mile, thinking it prudent to take up this position to ride out Easterly winds; made all preparations, having occasional puffs of wind; during the day veered to 50 fms. Winds E. N. E., Bar. 29.70.

Friday 14*th*.—At 4 A. M. blowing fresh from N. E. and very squally appearance, Barometer 29.60; Noon Barometer 29.40. Breeze still increasing in heavy squalls, let go the starboard anchor and veered out 20 fms. cable, we then got the third anchor over the bows and bent 45 fms. of spare cable to it.

9 P. M. Barometer falling to 29.24: 10.30 P. M. blowing a complete hurricane with terrific gusts from North, heavy sea, Barometer 29.13 falling to 29.08 veered away cable as fast as we could, but owing to part of the crew leaving off work, we could not do it very quickly.

Midnight a furious gale from North, heavy sea, Barometer on the rise 29.10 part of crew pumping, others hiding themselves.

Saturday 15*th*.—About 1 A. M. Barometer 29.20: ship began to drive, paid out nearly the whole of the starboard cable; 1.30 A. M. blowing a complete gale from N. N. W. with heavy gusts and rain, heavy sea, drove foul of the *Grappler* Buoy vessel, did not see her till we were along side; when we drove past her we cut away the 3rd anchor and veered out all the chain upon it, viz. 45 fms.

2 A. M. we took the ground abaft lightly but afterwards began to thump heavily, cut away the mainmast which eased the ship considerably, I conjectured, we were aground on Saugor Flat.

3 A. M. winds veered to W. N. W. Barometer 29.40, heavy surf breaking over us, four feet water in the hold. Daylight Barometer 29.50; winds W. S. W. found that the vessel was on shore abreast of the site of the New Light House on Saugor Point with six feet water in her hold; concluded she was bilged, some of her sheathing flanks floating up, the *Grappler* Buoy Vessel sent her boat which boarded us at 11 A. M.

G. B. Young, *Mate Pilot.*

Abridged Report of the H. C. P. V. Saugor, Mr. C. Blake, *B. P. Pilot's Ridge.*

On the 13*th May*, 1852.—At daylight the weather assumed a threatening appearance. We made all preparations for a gale. Weather growing too boisterous while we were heaving in cable could not sight the anchor.

The *Saugor's* log of winds, weather, Barometer and Thermometer for the days of the 13th and 14th of May, 1852, is as follows:

13*th May*.—First part a pleasant breeze, wind East, Bar. 29.61; Ther. 83o. 2nd part fresh N. East wind, Bar 29.66; Ther. 85°. Noon strong E. N. E. wind, weather threatening, Bar. 29.66; Ther. 86°. Last part hard gale, wind E. N. E. Bar. 29 56; Ther. 85°. 5th part hard gale, wind E. N. E. Bar. 29.54; Ther. 84°. 6th, midnight, hard gale from N. E. Bar. 29.53; Ther. 83o.

14*th May*.—First part wind from E. N. E. to N. East, increasing to a hurricane, Bar. 29.48; Ther. 83°. 2nd part wind N. E. increasing to a hurricane, Bar. 29.36; Ther. 82°. 3rd Noon, wind N. E. heavy sea and rain, hurricane increasing, with Bar. 29 28; Ther. 81°. 4th part the hurricane

at its climax, heavy sea and rain, Bar. 28.96; Ther. 80°. Lastly, symptoms of abatement, wind N. b. W. Bar. 29.00; Ther. 80°. Midnight wind N. West, hurricane fast abating, Bar. 29.28; Ther. 81°.

The *Saugor* rode out this hurricane with two hundred and ten fathoms of cable. It did not blow where she was lying so heavily as others that I recollect.

Report of the GRAPPLER *Buoy Vessel*, MR. J. H. CHALKE, *B. P.*
At Saugor.

Friday May 14th, 1852.

Barometer.			Wind and Weather.
4	A. M.	29.78	Blowing fresh from E. N. E. with passing squalls heavy.
6	,,	28.76	Cloudy weather.
7	,,	29.68	
8	,,	29.64	Blowing hard from E. N. E. squally threatening weather.
9	,,	29.63	
10	,,	29.62	
11	,,	29.60	
Noon		29.58	Blowing a gale from N. E. with hard squalls and heavy rain.
1	P. M.	29.51	
2	,,	29.47	
3	,,	29.41	
4	,,	29.34	Increasing gale from N. N. E. with very heavy gusts and rain.
5	,,	29.32	
6	,,	29.30	
7	,,	29.28	
8	,,	29.28	Blowing a hard gale from North with heavy gust accompanied with torrents of rain.
9	,,	29.26	
10	,,	29.24	
11	,,	29.24	
Midnight		29.22	Gale increasing from North, frequent heavy gusts blowing, and rain.
			Saturday, May 15th, 1852.
1	A. M.	29.21	From 1.30 to 2.30 A. M., gale blew its hardest from North to N. by W. and N. N. W.
2	,,	29.20	
3	,,	29.22	
4	,,	29.38	Drawing round to the Westward and moderating daylight.
5	,,	29.50	Gale moderating fast, Barometer rising.
6	,,	29.55	
10.30	,,	29.70	Moderate breeze from S. S. W. and fine weather.

Abridged Report from the H. C. F. Light Vessel HOPE, *Gasper Station.*

I beg leave to inform you that at 8 P. M. on Saturday the "*Hope*" F. L. V. began to drive, but brought up again in about 15 minutes, with the 2nd anchor, which was let go immediately she began to drive. On Sunday at 2 P. M. the vessel was anchored again on her station.

The hardest of the gale was from North to N. W. a perfect hurricane but the *Hope* behaved beautifully, and all was in readiness for a Cyclone.

Abridged Extract from the Log of the H. C. F. Light Vessel HOPE *Gasper Station.—By Mr.* THO. H. COLLINS, *Mate in Charge.*

Thursday, May 13*th*, 1852.—8 A. M. fresh easterly winds with dirty threatening appearance; 10, veered to 145 fms. port anchor. Sunset ranged the starboard cable to 50 fms. Barometers going down during the day; at midnight Aneroid 30.10; Ship's Bar. 29.58; Comdrs. Bar. 29.65 with a fresh E. N. E. wind and a heavy sea.

Friday May 14*th*.—Daylight blowing strong from the N. E. with threatening appearance and a heavy sea running, veered to 180 fms. made preparations for bad weather; 11 A. M. a gale from the N. E. *veering to the Northward in the squalls.** Noon blowing a heavy gale from the N. E. with heavy squalls and rain; 8 P. M. a heavy gale at N. b. W. with a heavy sea, vessel commenced driving, let go the starboard anchor; at 8.15 brought up in 4¼ fms. veered to 200 fms, hauled up and ranged 50 fms. of chain cable; 9, wind N. W. b. N. veering to the Westward blowing a perfect hurricane. It will be seen by the annexed table that the Barometers fell until 8 P. M. and then commenced rising, without however any diminution in the strength of the wind. Midnight blowing a hurricane at N. W. b. W.

Saturday, May 15*th*.—1 A. M. wind W. N. W. forestay sail blew away; 2 to 4, gale moderating; squalls less frequent and decreasing in strength, at 4, blowing strong from the Westward and gradually moderating. Daylight 5 vessels to the Northward, one totally dismasted, and another sunk close to the upper Middle Ground Buoy; a heavy sea running and unable to offer any assistance. Lower Gasper Buoy bearing N. W.; upper Middle Ground Buoy N. b. W. ½ W. in 4¼ fms. low water, ship about a mile and half S. E. from her station. 10. moderate breeze from the Westward, hazy weather and a heavy sea running.

* Italics are mine.—H. P.

A Table shewing the change in the Barometer and the veering of the wind from 4 A. M. *of Friday,* 14*th May, to* 8 A. M. *of the* 15*th instant. H. C. F. L. Vessel* HOPE.

Hour.	Aneroid.	Ship's Bar.	Comdrs. Bar.	Winds.
4 A. M.	30.7	29.54	29.60	N. E. — Squalls more frequent and increasing in strength.
6 14th	30.5	29.52	29.55	
8	30.2	29.50	29.55	
10	29.98	29.45	29.50	
Noon	29.95	29.41	29.48	
2 P. M.	29.85	29.37	29.41	
4	29.73	29.20	29.28	
6	29.52	28.97	29.00	N. N. E. to North.
8	29.45	29.00	28.98	N. b. W.
9	29.50	29.10	29.05	N. W. b. N.
10	29.55	29.16	29.11	
11	29.61	29.24	29.20	N. W.
12	29.65	29.32	29.30	N. W. b. W.
1 A. M.	29.72	29.40	29.38	W. N. W.
2 15th	29.85	29.53	29.50	W. b. N. squalls less frequent and decreasing.
4	29.92	29.60	29.59	West a strong breeze.
6	30.00	29.65	29.63	
8	30.7	29.67	29.70	

Reports by Electric Telegraph from Diamond Harbour,
14*th May,* 1853, *State of the Weather.*

At Diamond Harbour.—Morning light winds from N. East, with drizzling rain, at noon strong breezes from East, attended with slight showers of rain, and cloudy weather. Thermometer at noon 87°. Wet bulb 78°. From noon till 6 P. M. blowing violently from East, with heavy rain.

Aneroid Barometer, at 10 A. M. 29.600
——————— at 4 P. M. 29.400
Standard Barometer at 7 P. M. 29.450

Fall of rain, at Diamond Harbour, from noon till
6 P. M. .. .. Inches 0.70
Calcutta, ... 0.20
to 7 P. M. 14th May.

15*th May,* 1852, *Diamond Harbour Report. Received at* 7 A. M.

From 8 P. M. to 12 P. M. last night blowing violently from East, with heavy rain—at 1 A. M. the wind veered to N. West, blowing still harder. At 4 A. M. a perfect hurricane—still continues—several huts and trees

have been blown down in the village—our Raingauge has also been blown down, therefore we are unable to give the fall of rain.

Standard Barometer at 10 A. M. 29.540

State of the Weather.

At Diamond Harbour.—From 6 A. M. blowing furiously from West, and slight rain, the premises and the station huts have been much injured, Weather cloudy. Thermometer at noon 83°. Wet bulb 78°.

Aneroid Barometer, at 1 P. M. 29.55

——————— at 4 P. M. 29.55

On the 16th, fine Southerly breeze is reported.

Register of the Barometer and Wind during the Gale of the 14*th and* 15*th May*, 1852,*on Board of the P. and O. Co.'s Steam Ship* HINDOSTAN, *Garden Reach.*

Time.	Bar. by Cox.*	Bar. by Lilley.	Wind.	Hindostan. Garden Reach.	
8 A. M.	29.67	..		Friday, May 14th.	
				Ther.	
Noon	29.58	..	E. N. E.	80°	
3 P. M.	29.50	29.52	..		
5.30	29.46	29.43			
8.0	29.40	29.36	N. N. E.	78	
9	29.37	29.33			
10	29.27	29.24		75	
11	29.19	29.13			
Midn.	29.9	29.63	North.	75	
1 A. M.	28.94	28.84	..	..	Saturday, May 15th.
2	28.87	28.83	N. W.	75	
2.50	28.89	28.88			
4	29.01	29.03	West and		
5	29.13		W. N. W.		
6	29.26	29.23		75	
8	29.41	29.35		78	
11	29.53	29.42			
Noon	29.55	29.48	W. by N.	80	

* Barometer compared with the Standard at Madras Observatory, each Instrument 30 feet above the level of the sea.

H. HARRIS.

Calcutta Newspaper Account.

During the storm of Friday night, nearly all the ships in the Cooley Bazar moorings parted their own chains. The *Glentanner* parted her own chains at the Calcutta moorings, and went on the bank; it is thought she will have to go into dock. The *City of Calcutta* dragged both her anchors, got foul of the Government moorings, and got on shore at Chandpaul Ghat, little or no damage done. All the ships in the harbour dragged their anchors more or less Numbers of boats, bauleahs, budgerows, pinnaces, and country boats were swamped, and a great deal of property lost. The river, on Saturday morning, was covered with bales of jute, silk, opium, masts and spars of vessels, the wrecks of dinghees, &c. Some lives are supposed to have been lost, but as the gale came on in the evening, the boats were mostly moored to the shore where escape was easy.

In Calcutta much mischief was done to buildings. An unfinished house in the Chitpore road, belonging to one of the Mullick family, fell down upon the adjoining stables, and destroyed some valuable horses and carriages. In Moorgeehutta a lower-roomed house fell in, and buried an elderly lady and her two grandchildren under the ruins. By the exertions of a neighbour, Mr. Arathoon, the lady and one of the children were extricated without serious injury, the other child, a girl of five years old, was killed.

In the suburbs, hundreds of huts were levelled with the ground, and the gardens every where laid waste.

On the Barrackpore road about fifty of the largest trees were uprooted, some of them fell across the road, making it nearly impassable in several places. About the station many large trees were prostrated, but the Park fortunately escaped with little serious injury, though the fences were blown down in many places.

About Calcutta the trees are stripped of fruit, mangoes particularly, but what is very remarkable is the number of crows which have perished. Heaps were piled up at the corner of many streets on Saturday. They generally take care of themselves, but this being the breeding season, it is supposed they would not quit their nests. There has been great destruction among the yachts. Two or three are lying sunk near the Fort, and several others are reported missing.

My own observations at Calcutta are as follows.

14*th May*, 1852.—During the night, squalls and light rain from the Eastward with puffs of wind, rising and falling at times. At 2 A. M. Bar.

low, about 29.76.* Daylight to sunrise, fresh breeze N. East. A bank of stratus and nimbus from East to N. East with heavy masses of loose ragged cumuli which were breaking and passing over us in loose detached ridges, and webs of smoky scud. *About* 6 A. M. *weather seemed to clear up from the Eastward but no rise of Barometer.*†

At 10 A. M. Bar. (corrected to that of Surveyor General) 29.71; Symp. 29.90.

N. B. No rise since 4 A. M. rather a fall, Bar. being then about 29.74. Fresh breeze N. E., masses of dark smoky cumulous scud travelling from the Eastward. Bright sunlight where openings occurred and larger dark masses passing now and then. Wind E. N. E. blowing in strong squalls and puffs at times.

At 1h. 30′ P. M. first dark rain squall occurred, at 1 P. M. Bar. 29.659; Symp. 29.85; Ther. 85¼°. Squalls and puffs as before. Wind E. N. E. to N. East.

3h. 40′ P. M. Bar. 29.609; Symp. 29.81; Ther. 85°. 4h. 5′ P. M. Bar. 29.529; Symp. 29.75; Ther. 84¾°. Gloomy squalls and rain. Wind N. East. Scud N. East.

5h. P. M. Bar. 29.509; Symp. 29.75; Ther. 84°. Wind N. N. E. to N. East with squalls and drizzling rain, but the rain in loose large drops! At 10h. 10′ Bar. 29.309; Symp. 29.60; Ther. 82¼°. Blowing hard from E. N. East as nearly as can be guessed.

At 11h. 20′ Bar. 29.169; Symp. 29.50; Ther. 82°; blowing a hard gale, but too dark to ascertain its exact direction; tremendous squalls at times.

15th May.

Time.	Bar.	Simp.	Ther.
A. M. 0h.5′	29.079	29.42	82°
25	.009	.39	..
1. 5	28.879	.33	..
1. 45	.859	.30	..
Wind now to the Westward of North; heavy gale.			
2h.15′	28.829	28	81¾°
3 . 0	.909	34	81½
3 .20	.989	39	..
Wind N. Westerly.			
4h.00′	29.059	44	81¼
6 .30	.329	62	81
Heavy gale at West, scud from S. West.			
8h.20′	29.499	29.64	81
Decreasing gale West. By Noon, weather comparatively fine.			

* Register blotted.—H. P.

† The treacherous clearing up for a short interval which I have so frequently adverted to.

Report from Baugundee, a Salt Agency Station, in Lat. 22° 38′ *N.; Long.* 88° 57′ *East; about* 39 *miles E. b. N. from the Flag Staff of Fort William, by* F. Crank, *Esq. Bengal Salt Agency.*

It will be seen that this Cyclone fortunately* passed up to the Eastward of Calcutta, through the Sunderbunds where it not only tore to pieces every thing in its passage, even to a *pucka* (brick-and-mortar-built) house, but drove the river-steamers in their sheltered crecks into the jungle. A relation of Mr. Crank's shewed and allowed me to make some extracts from a private letter, and these together with Mr. Crank's very intelligent replies to a letter of queries subsequently addressed to him by me, have enabled me to frame the following very interesting narrative of the passage of the centre of a Cyclone on shore by a person, who was evidently perfectly cool and collected. In this summary, it will be recollected that the facts and most of the phrases are Mr. Crank's, and I have indeed sometimes given my own queries to introduce his reply verbatim.

"For a day or two preceding the gale there was a heavy scud from the Southward with a high temperature of from 90° to 93 in Mr. Crank's rooms to the Westward. The gale set in from the N. East on the 14th but by the time it was blowing a gale, it was at about E. N. East, and when the hurricane was at its height the wind was about two points to the Northward of East. Up to 2h. 30′ a. m. of the 15th, it went gradually veering round to the Southward when a sudden lull of about ten minutes duration took place. He was looking from his door to the Westward when he heard the sound of the tempest approaching from the opposite point to that at which it had commenced, or South West. The sound was terrific and it burst with more violence than before on the Western side of the house tearing the thick beams of the verandah out of their places in the wall, and scattering them like straws, whilst the verandah itself covered with a double layer of Syrian or flat tiles, was pierced by it in several places; holes of 6 or 8 feet in diameter being blown through the roof. He then thought it prudent to place his wife and family in security. The interval of the lull as before said was perhaps ten minutes when the wind shifted suddenly from about E. b. S. or E. S. E. to the S. West, and the hurri-

* I say fortunately, for we were thus 35 miles to the West of its centre where it evidently was of terrific violence, and had its track been up the Hooghly not a ship then in the river would have escaped. We may also judge in some degree how important to a ship even this short distance from the centre must be, and how it occurs so frequently that one ship is utterly torn to pieces *at* the centre while another escapes at a very short distance from it.

cane which ensued was terrific. When he left his house all the venetians, doors and glass windows of the upper and lower story were all blown in. The roof of one room had fallen, and the brick pillars of the verandahs were broken in two or three places, the storm had a clear drift through the house and some of the furniture was even blown out of the windows; chairs, &c. being found on the bank of the river the following morning. There was no thunder or lightning during the storm. Mr. Crank being repeatedly out in it, so that he speaks very positively as to this, which he must have perceived had there been any. It was at three in the morning that Mr. Crank's family were obliged to take shelter; first in a low cow-house, of which the roof also beginning to give way they were driven as a last resource to a *pucka* (brick-built) pig-stye! which being still smaller and lower, and substantially constructed, fortunately withstood the fury of the elements,* which was so great that the family were repeatedly blown down in their retreat from the house to their place of refuge.

Mr. Crank stating in his private letter that "earthquakes prevailed throughout the whole night," my query on this head and his very important reply are as follows:—

In "What were the nature of the earthquake shocks you mention, and are you quite sure of them, as distinguished from the vibrations of the house in the gusts of wind? Are you also familiar with earthquake shocks so as readily to recognise them?

Answer.—The shocks I experienced when out of the house, at about 2h. 15′ A. M. of the 15th were oscillatory and very severe. One I experienced in the upper story of my house I cannot correctly describe. Another at 4 A. M. or thereabouts was of the same character as the above. It could not in this case have been the vibration of the building I was in, because it is an extremely low one, being used as a pig-stye and pigeon-house, and is a very strong pucka edifice. As I have experienced many earthquakes both in Persia and Assam, and am generally calm and collected I feel sure the shocks were those as described (to his Calcutta friends) and that throughout the night. After the hurricane set in, they were repeated. With the first shock outside the house, I plainly experienced a very unpleasant smell which I attributed to some gaseous exhalation;† I have noted the same peculiar odour on other similar occasions,

* This is exactly the history of the Mauritius and West India planters, who on the large plantations have a strong low built "hurricane house" ready for these occasions, and on the poorer ones the families take refuge in the negro huts in sheltered spots.

† Perhaps Ozone?—H. P.

and I fancy it is corroborative of one of the theories anent these phenomena."

Mr. Crank mentioned also a confusion of strange and horrible sounds, and he describes them as follows :—

Query.—What were the nature of the sounds you describe? You were so near to, or at the passage of the centre, where these singular noises are freqaently described, that it is of much interest to know something about them?

Answer.—"The sounds noted in my letter to Mr. R.—were of so peculiar a nature that I can scarcely describe them. You have doubtless been on the deck of a ship in a dark night where the upper sails have flapped against the masts? Such like sounds met my ears on the night of the 14th.* Then it would appear as if vast bodies of winged animals were hurrying across, whose wings were striking against each other in a thousand directions.† These sounds were blended with others not less unusual —crashing like trees—whistling—roaring—or as if heavy bodies were falling from a height against each other, and by the concussion were shattered into fragments. At this time I was out on the plain, and the strife of the elements was awful; ever and anon *such a pressure of the wind from above, that I was almost crushed to the earth;* then it would strike me on one side—then on another, and I came to the conclusion that I was in the centre of a whirlwind.‡ I was for a time stupified. To turn my face to the Eastward for more than a few seconds was impossible, the rain was driven with the force of arrows into the face, and the oppression was similar to what one feels on riding a fast horse at racing speed.

Unfortunately, and this he very much regrets, as we must also do, the only instrument which Mr. Crank had with him was a Thermometer, which stood till the lull at about 88° in a room, but he is not certain as to a degree or so, not having his glasses at hand. At the time of the lull it became so exceedingly cold that every one remarked it, and on looking at the Ther. he found it standing at 65 or 66°! At daylight it was at 90° or something less."

* The cracking of a huge electrical machine we might suppose to produce such sounds?—H. P.

† The rushing noise of the currents of air as generated by the electric discharge? see Peltier.—H. P.

‡ This passage is one of immense importance, for together with others which will soon be published, it settles the question of any upward tendencies of the wind at the centre in the negative, and very strongly corroborates my theory of electric and spiral currents.

In describing the track and ravages of the storm, Mr. Crank mentions that a large Casuarina tree, at about 100 yards distant from the East verandah of his house, was literally cut off even with the surface of the earth. His Bauleah which was securely fastened adjacent to it was *torn to pieces*, the roof of the cabin being thrown many hundred yards to the Westward; while some of the windows were picked up at nearly a mile distant.* His house was reduced to such a ruin that it was dangerous to approach it, the parapet wall, balustrades, &c. being, as it were, cut off.

Mr. Crank seems to think that the force of the storm was most strongly felt for about half a mile on each side of Baugundee, and he estimates the track of country over which it passed by the accounts from his salt *chowkies* (station houses). This would make the centre one mile in breadth only, and accounts in part for the awful violence of it within that limit, for it has always been found that when the diameter of the central lull is small, the intensity of the Cyclone there is much greater.

He farther states that great loss of life, and of cattle and other property took place in consequence of the excessive and sudden rise of the rivers all over the Sunderbunds, which obliged those who had no other resource to take refuge in the trees.

Reports from Steamers in the Sunderbunds.

Two of the River Steamers, one of them the property of Government and the other belonging to the Ganges Steam Navigation Company, were driven on shore in the Sunderbunds;† and carried by the storm wave up *over the trees!* into the jungle, from whence they had to be extricated by cutting canals after the Cyclone was over. The following are their logs which fortunately serve very accurately to mark the track of the centre, as they were on the Eastern verge of the centre (wind veering from E. S. E. to S. S. E. and South, to West) and their positions being at a short distance from each other only and 44 miles S. b. E. of Baugundee.

* In a severe Tyfoon from the Bay of Manilla in 1816, when all the ships lying at Cavite were driven on shore, an American ship lost her cutters, which were blown from the davits. About a month after the gale the Captain of the ship taking a walk into the country saw something very strange in a mangoe tree near a village about four miles from the anchorage, and paid an Indian to get it down for him. It proved to be the stern of his own cutter!

† Indian readers do not require to be told, but some European ones may, that the Sunderbunds comprise a vast extent of low jungly islands, as large as the principality of Wales, intersected by a thousand large and small rivers, streams, and creeks forming the Delta of the Ganges and Hooghly, and in which boats are perfectly sheltered.

Abridged Log of the H.C. Steamer "BERHAMPOOTER" P. M. CAWLEY, *Commander, towards the Presidency; 63rd trip. N. B.—At anchor in the Soyah in Lat.* 21° 54′ *N.; Long.* 89° 02′ *East, by* TASSIN'S *Map.*

Friday 14*th May*, 1852.

Bar.	Ther.	Time.	
29.55	82°	A. M.	Strong Easterly winds and cloudy.
..	..	5.00	Steam up, weighed, and proceeded full power.
29.50	88	Noon	Ditto winds with passing showers of rain.
..	..	1.10	Passed steamer *Chunar*, at anchor in the Fringhee Khall.
..	..	3 P. M.	Entered Attarah Banka river.
29.35	70	4.00	Increasing breezes and passing squalls from E. S. E.
..	..	5.15	Roymungul river.
29.20	..	5.30	Bearry Khall; observed every appearance of a gale from the Eastward, ran well up the Soyah for safe anchorage. Owing to the weather having a threatening appearance, Captain Cawley orders an Officer's watch to be kept.
28.80	..	7.15	Anchored for the night in 4 fathoms with 70 fms. on the best Bower and 50 on the small; blew off steam and kept fires low, the river apparently well sheltered and very smooth water.
28.62	..	8 P. M.	Gale increasing. Got the steam up and worked ahead full power.
28.45	..	10.00	Gale still increasing, observed the vessel driving with engines working full power and both anchors ahead.
27.80	..	Midgt.	Vessel driving, gave her a little more chain, unable to give her much for fear of the wynch breaking. Midnight blowing a hurricane from S. S. E. the large cog-wheel of the wynch carried away—both chains parted and vessel took the bank. Sea making a clean breach over her, and crew employed baling water out of the vessel, the Flat Matabangah parted from beam lashings, and both banks being inundated, the hurricane blew the vessel about half a mile on the bank, blowing away sails and topmasts, rigging, bamboos, boats, oars, &c.

Saturday, 15th May, 1852.

..	..	A. M.	Blowing a hurricane from S. S. E. vessel driving *over* the thick jungle, sea breaking over her.
		2.30	Observed vessel stationary—buried in thick jungle, the sea still washing over her.
28.30	65	2.45	Gale moderating and veering to the Westward stopped the Engines and blew off Steam.
28.65	..	4.00	Gale veering to N. W. and moderating. Daylight observed the Matabangah high and dry as ourselves, bearing S. E. by S. about 100 fathoms from us ; and the nearest bank of the river N. E. by E. about 375 fathoms and nearest to a Nullah N. E. by N. about 275 fathoms. Overhauled vessel's hold and found no damage done, sent Mr. Smart to the Matabangah, which was found to have a tree through her bottom, which the Commander soon stopped up. Mustered the crew and found all correct. No lives lost, the crew's provisions much damaged.
28.92	..	8.00	N. E. breezes and cloudy, our Jolly-boat being lost, launched the flat boat through a creek and sent Mr. Smart, mate of the steamer and Mr. Wheelan, Clerk of the "Matabangah" with four men from each vessel up to town with reports, and for assistance ; commenced clearing away the wreck and jungle.

Ganges Steam Company's Steamer "CHUNAR" *in the Sunderbunds, May 14th,* 1852.

At 5 A. M. cloudy weather with fresh Easterly winds.

9.45, entered the Fringhee Khall.

10.15, wind increasing with squalls, turned back for an anchorage.

10.40, wind E. N. E. anchored in 5½ fms. kept Steam back for the flood.

3 P. M. Steamer *Berhampooter* with "Bhagrutty" passed on her way to Calcutta.

4, wind increasing to a gale with rain, let go the 2nd anchor and veered to 30 fms.

8, Gale increasing, veered to 50 fms. best bower, 30 fms. on 2nd ditto.

10, Wind East, terrific squalls, wind gradually veering round, thick

rainy weather. Sea washing over all, pumps carefully attended to. Wind S. East, veering to the Southward with squalls, blowing a hurricane at times, vessel drove on to the opposite shore, taking the bank aft, slacked Steam.

Midnight, both boats swamped with the sea washing over them, the roof of the 2nd officer's cabin blown off. Crew employed at the pumps.

Saturday, May 15th, 1852.

0.30 A. M. winds veered to South, the awning deck over foredeck, blew off, taking all the stanchions fore and aft both sides with it into the jungle about 100 yards.

4.30, wind still as violent and vessel shipping great quantities of water, every thing inundated and blowing to pieces.

6, Wind S. E. moderating, got the boats alongside, baled out.

7.30, succeeded in getting the vessel off the bank, weighed and proceeded a little way and anchored. Sent crew to pick some of the wreck of the awning deck.

Observations made at Chandernagore, by Mr. G. B. SMART, *Master Pilot, H. C. M.*

13*th May,* 1852.—Sun rose this morning very pale, appearing like a large moon. In the morning Northerly wind; during the day variable from E. N. E. to S. E. Noon Barometer 29.68.

Chandernagore, 14*th May,* 1852.

Hour.	Bar.	Wind.	Remarks.
			All the forenoon Barometer 29.50, wind from E. N. E. and squally with passing showers of rain.
Noon	29.47	E. N. E.	Ditto Ditto.
2 P. M.	.42½		
3	.41	..	
4	.35	..	
4.30	.32	..	
6	.30	..	
7.30	.28	N. E.	Increasing wind, and squalls more frequent.
9	.24	..	
9.30	.20	..	
10	.17½	..	
10.30	.15	..	
11	.10	N. N. E.	Blowing very hard, and squalls increasing.
11.30	.5	..	Strong gale and squalls increasing in violence, and in quicker succession.
Midnight	29.0	..	

Chandernagore, 15th May, 1852.

Hour.	Bar.	Wind.	Remarks.
1 A. M.	28.90	North	Gale increasing in violence as well as the squalls.
1.30	.82	..	
2	.77	..	
2.30	.72	..	
3	.68	N. W.	Blowing a fierce hurricane, and squalls in violent gusts, and in rapid succession: The lowest fall of the Barometer.
3.30	.65	..	
4	.69	..	
4.30	.75	..	
5	.80	W. N. W.	Wind and squalls moderating in violence.
5.30	.86	..	
6	.95	..	
7	29.2	.	
8	.10	West	Still more moderate and weather clearing up. Squalls occasionally.
9	.20	..	
10	.27½	..	
11	.32	..	
Noon	.37	W. S. W.	Moderate wind with fine weather. Barometer rising rapidly.

Reports from the District of Kishnaghur, from Mulnath Factory, Lat. 23° 05½′ *N.; Long.* 88° 46′. *E.*

The following account of the late Cyclone is contained in a letter from the district of Kishnaghur:—

"We have had a frightful storm here, the mischief done is almost incredible; round this place nearly every tree is either down or injured, and from all the factories I have accounts that nearly every thatched building is quite destroyed. In the villages also it is quite sad to witness the havoc that has been made, trees and houses all lying in one grand chaos. Great numbers have received serious injuries, and there has also been a very serious loss of life. On Friday it blew pretty fresh all day, with the Barometer gradually falling. In the evening the wind increased, and about 12 o'clock the hurricane begau in earnest. It was worse between 4 and 5 o'clock—the wind then from the N. W. and Barometer standing at 28.4 where it remained till a quarter-past 6, when it rose to 28.6. At a quarter past 7 to 29, quarter-past 8 to 29.2, at 9 o'clock to 29.3, and at half past 10 to 29.4 when the storm broke, though it blew violently till noon. I think we must have had it here more severely than even you have had it in Calcutta—though you appear to have had it badly enough. In this concern, thirty people have been killed, and I have just heard that my boat, which I had sent for a friend, has gone to the bottom,

and that a poor chuprassee and four of the men have been drowned."—*Calcutta Englishman.*

Letter from Kishnaghur from Major LANG, *36th N. I.*
Lat. 23° 26′ *N.; Long.* 88° 35′ *East.*

I greatly regret that I cannot furnish any Barometer register, but perhaps the following account of the storm, as experienced at this station, may be acceptable.

Throughout the whole of Friday the 14th instant, the weather was unseasonable, with heavy clouds and the wind hanging to the North of East; there were occasional squalls during the day. Towards evening, although appearances continued threatening, the wind was moderate and remained so till about 9 P. M. when it began to freshen considerably.

Up to this time I think the wind was variable, changing a point or two towards the North and falling back again to East. At 10 o'clock the storm may be said to have commenced;—the wind then blew in strong squalls from about E. N. E. gradually veering to the North. By midnight it was due North, and from this point it continued to blow with great fury for several hours. At times there was heard a low rumbling noise, which might well have been mistaken for thunder, but I believe it was the effect of the wind; there was no lightning.

From 2 to 4 A. M. of the 15th, the hurricane was at its height; it then, as far as I could judge, blew from two or three points to the West of North. The gusts at times were crushing, and it seemed as if nothing could withstand their force; they were accompanied with a continuous driving rain. At day-break there was a scarcely perceptible decrease in the fury of the storm. The clouds lay very low, and the scud was borne along with great velocity, the rain continued at intervals. From sunrise the gale gradually moderated, although up to 12 o'clock there were occasional squalls, which, but for what had preceded them, would have been thought unexampled in their violence.

At 6 A. M. the wind was W. N. W. veering slowly to the West from which point it continued to blow freshly till the afternoon when the weather cleared up.

Letter from Katgurrah, from R. P. SAGE, *Esq.*
Lat. 23° 16½′ *N.; Long.* 88° 57′ *East.*

Saturday, 8th May.—A. M. cloudy. Wind S. W. moderate, very heavy rain for two hours from S. E. night strong S. E. wind.

Sunday, 9th May.—A. M. weather clear, with strong S. E. wind. Noon wind S. W.; P. M. very hot, atmosphere hazy; 6½ P. M. a wind, stormy appearance to the N. W. night close and cloudy.

Monday, 10th May.—A lurid haze prevailing throughout the day. Wind high, variable N. E. to S. W.; P. M. high wind throughout the night.

Tuesday, 11th May.—The same as yesterday.

Wednesday, 12th May.—Atmosphere somewhat clearer, wind as yesterday.

Thursday, 13th May.—A. M. heavy clouds to the South. Wind S. E. and blowing strong throughout.

Friday, 14th May.—A. M. heavy black clouds all round, wind blowing very strong from the East all day. P. M. cloudy; 7½ P. M. wind increasing till 11 P. M. when it blew a hurricane from the Eastward, midnight wind from N. E. with much rain.

Saturday, 15th May.—1 A. M. gale blowing with tremendous force, trees and houses falling in all directions; gale continued with unabated force till 5 A. M. when it lulled slightly and the wind veered round by the North to the West, whence it blew very hard till near 9 A. M. whence the wind fell considerably, and at 10 A. M. the rain ceased. 3 P. M. wind high from S. W.

Sunday, 16th May.—Light S. W. *b.* S. wind, with very hazy atmosphere.

Monday, 17th May.—A. M. clear, few clouds about, wind S. E.; 9 P. M. a North Wester with a shower of rain.

The whole country round wears a most desolate aspect.

Report from the road from Jessore towards Calcutta.—By G. F. Cooper, *Esq.*

Being at Jessore during the late storm and returning thence direct by dâk to Calcutta on Friday last I was enabled to make a few observations which, though in all probability, you are already acquainted with, I will endeavour to lay before you.

During the whole of the previous day we had a high East wind at Jessore which increased during the night to a perfect hurricane. At or before break of day the storm was at its greatest fury, the wind being then from the South East, later in the day and when the storm had abated, the wind was N. Westerly.

For some twenty miles the South side of Jessore, the storm, *judging from the fallen timber*, appears to have taken the same course, but after passing that distance or say thirty miles from Jessore, the current appears

to have entirely changed; all prostrate timber, &c. lying N. Westerly, the direction of the current being diametrically opposite to that experienced at Jessore. This at once indexes the centre of the Cyclone as being mid-way between the distances I have named.

Perhaps I have not expressed myself in a very lucid manner, and will venture upon reiterating my statement; at Jessore and for twenty miles or so on the road to Calcutta, the fallen trees were lying across the roadway from *left* to *right* (S. E. to N. W.) then after passing that distance I found them lying from right to left (N. W. to S. E.) The road, as you may be aware, being in a straight line running to the N. E. from Calcutta, and the intermediate distance between the two places being eighty-six miles.

The points of the compass I have named, you will please to consider *as about* the direction from whence the wind blew and not restricted to a few degrees.

EDW. THEO. COOPER.

P. S.—Great ravages were committed by the storm. At the spot I have surmised as the vortex, I observed a *prostrate* banyan tree, whose stem could not measure less than 25 feet in circumference.

Jessore, Lat. 23° 9′; *Long.* 89° 12′ *East.*

The following is from Jessore:—"During Thursday 13th, fresh breeze from the Eastward with cloudy appearances. 6 P. M. wind steady at about E. N. E. with very threatening appearance. At 11 P. M. fresh gale from ditto with occasional smart squalls. From 2 A. M. till 6 A. M. of the 14th, a regular "hurricane" with rain. At 6.30 A. M. wind shifted round to W. S. W. and came down with great fury, carrying every thing before it. At noon moderate Southerly wind, with occasional showers of rain. At 4 P. M. weather fine. During the gale of the 14th, Friday, every hut has been levelled to the ground, killing natives without number. The abkaree office blew to pieces; all the stables in the station ditto; pucka houses have suffered greatly, windows, glasses, sashes, &c., all blown away, trees of many years standing are now laid flat on the ground. Such havoc has not been witnessed in Jessore for many a year."

Extracts from a letter from Muddendarrie Factory, district of Dacca, Lat. 23° 28′ *N.; Long.* 89° 40′ *East.*

"I observe by your Monday's *Englishman* that with you the gale commenced from the N. N. E. at 1.30 A. M. of the 14th, and your first rain-squall occurred at noon of the same day. With us it was quite different, for

there was scarcely any wind at all, till sunrise on the 14th, when a strong breeze from the East sprung up, and continued all day, the day being bright and clear, so much so, indeed that I never once thought of a gale being so very near at hand. I retired to my bed at my usual early hour, and slept soundly till midnight, when I perceived that the wind had somewhat increased; but still there was no rain, and I in consequence thought not of a gale. At half-past 2 A. M. 15th, I was roused up by a crash in the verandah, and the clapping and banging of doors and windows all over the house. I ran into the Southern verandah, through which I found the wind and the well known storm sleet was rushing like a torrent, announcing at once what was probably in store for us. I made all snug, and prepared for a blow, and a blow we had with a vengeance. From 3 A. M. of the 15th till 6 o'clock, it blew as hard as it *could*, and from 6 till 9 it blew still *harder!* My house is a very strong *pucka* one, yet it shook from end to end under each sounding shock it received from the terrific gusts of wind; doors, windows, sun-shades, venetians, &c. &c. were blown in and out, and sent flying all round the factory like shreds of brown paper, trees were torn up by the roots, sheds and houses laid low. The river which had risen 6 feet, lashed its banks in fury, till the said banks came toppling over with a tremendous splash and surge, to add to the general confusion. During all this time the wind was veering from East to South East, to South; at 9 it went round to South, then to S. W., and eventually (at about 1 P. M.) died away at West. Since the gale we have had one S. Wester and two North-Westers, accompanied with heavy rain."

The following is an extract of a letter from Malda, Lat. 25° 03′ *N. Long.* 88° 04′ *East*, 20*th May.*

The following is an extract of a letter from Malda, 20th May:—

"The Cyclone noticed in your paper of the 17th instant visited this district, but as its centre must have passed considerably to the Eastward of us, little damage has been done to our plant.

"Not being in my own house during the gale, I could not notice the Barometer, which I much regret.

"14*th May.*—On the afternoon it was evident enough that bad weather was in store for us, but as we were much in want of rain to refresh our drooping plant, the heavy clouds were hailed with delight. The heaviest looking clouds were towards the South-East, and were accompanied with vivid lightning. I noticed nothing more, and it was only when I rose on the morning of the 15th, that I was aware that a Cyclone was passing over, the centre of which must be some distance to the Eastward.

"6 A. M.—Blowing a strong gale from the N. N. East, and rain, not very heavy.

"8 A. M.—Wind increased, some of the gusts very heavy, North by East.

"Noon.—Blowing from due North, rain heavy.

"3 P. M,—The wind had veered to about N. N. W., and its force considerably moderated, rain less heavy.

"5 P. M.—The gale had evidently broken, the blue sky appearing in places and the wind now blowing in occasional gusts, greatly fallen, its direction being nearly due West.

"The loss of boats on the Ganges near this has been very great, but the Indigo has sustained no damage, the greater portion being too small to receive hurt."

Report from the station of Furreedpore, Jessore, Lat. 23° 36½′ *N.; Long.* 89° 51′ *East.—By* T. B. MACTIER, *Esq. C. S.*

For several days preceding the storm, the weather was exceedingly stormy, and during the 14th, there was a good deal of wind which however, died away, and in the evening it was exceedingly sultry with a very threatening sky. I may here observe that for three days previous to the storm the prevailing winds were Easterly! About 9 P. M. a moderate breeze sprung up from East which veered Northwards, and at 11 P. M. the wind was N. N. E., it then went back again gradually increasing in violence until it reached S. East which it did at 7.30 A. M. (15th) when it was at its greatest height, it then went Southwards, gradually decreasing in strength and died away to a moderate breeze about 6 P. M. (15th) at which hour the wind was W. S. W.

The Barometer and Thermometer stood as follows:—

		Bar.	Ther.
15*th*.—½ p.	6,	29.154	79.8
½ p.	7,	29.134	79.2
	9,	29.176	78.4
¼ p.	10,	29.258	78.4
½ p.	5,	29.474	79.4

The damage done to houses and trees was very great, but it did not appear so violent as the storm which visited the Bancoorah district in April, 1850, an account of which I think sent you.

From the native accounts, the storm was most severe between this and Dacca, and in Pergunnah Vikrampúr near the junction of the Kirtinassa and Megna, the sea is said to have rolled over the land in a wave 7½ feet high. I am doubtful of this however.

Report from RamporeBauleah, Lat. 24° 22½′ *East; Long.* 88° 36′ *East.—By* J. R. Bedford, *Esq. Civil Asst. Surgeon, H. C. S.*

On the 14*th.*—At 4 P. M. the Barometer stood at 29.644; at 4h. 30m. P. M. a South-Easter came up in one heavy roll of steam-like clouds which hung low, and occupied but half an hour in travelling from one visible horizon to the other. It was accompanied by a stiff gale.

At 12 at midnight the Cyclone began from N. E. veering to N. at 2 A. M. of 15th; and between that and 7 A. M. to N. W. It travelled round to W. as the day advanced and blew from S. at 9 P. M.

I was unable to note the Barometer until 7 A. M. from which time its hourly uncorrected reading was as follows:—

Hour.	Newman's Standard Barometer.	Attached Thermometer.	Direction of wind.
7 A. M.	29.240	77°	N.
8	.214	77	N.
9	.140	77	N.
10	.066	77	N.
11	.036	77	N.
12	.088	77	N.
1½	.232	78	N.
2	.276	78	N. W.
3	.320	79	N. W.
4	.354	79	N. W.
5	.428	79	N. W.
6	.480	79	N. W.

The wind's force began to diminish simultaneously with the rise of mercury but blew with a force of 6 (Admiralty symbol) as late as 6 P. M. At 9 P. M. it had veered to South and was very moderate.

Throughout the gale the sky was one mass of nimboid cloud. The total fall of rain during the 24 hours of its continuance, was 3.35 inches. No thunder was heard or lightning seen, but the noise of the gale and density of clouds were sufficiently great to have masked either one or the other.

About 150 huts have been destroyed, but as far as I am aware there has been no loss of human or animal life on land in this neighbourhood.

The destruction of property appears to have been much greater in the Southern and Eastern part of the zillah.

Report from Jeypoor Bogoorah, Lat. 25° 15′ *N.; Long.* 89° 03′ *E.—By* J. W. Payter, *Esq.*

May 14*th.*—9 P. M. till midnight wind strong from the East, gradually increasing.

15*th.*—2½ A. M. wind rising rapidly to a gale at 5 A. M.; at 6 A. M. a perfect hurricane from the N. N. E. and continuing without intermission in gusts till 2½ P. M. with continued rain in sheets—at the latter hour it moderated and the rain ceased; people in the villages peering out to see the extent of their own and neighbours' losses, but there was not much time afforded for examination, for by 4 P. M. the wind had again got up in the opposite quarter W. N. W.; and at 6 P. M. was as furious as before till 9 P. M. when it began to subside, until 10½ P. M. when it settled into a steady light breeze from S. E.

16*th.*—Cloudy, with the same Southerly wind till 9 P. M. when we had another storm (without rain) from the S. West.

17*th.*—The sky still very cloudy, country deluged with the rain water.

Report from Bancoorah, Lat. 23° 14′ *N.; Long.* 87° 05′ *East.*—*By* G. N. Cheek, *Esq.*

As we are having a gale I send you the particulars of what has occurred here. On the 13th May, P. M. I find in my note book, the following remark: "I shall not be at all surprized again to have a May gale," on the morning of the 14th we had East winds in rather strong puffs, which had been the case during the night of the 13th. 3 P. M. 14th, wind strong in puffs, with occasional showers and heavy masses of clouds going to the West; wind at 3 P. M. E. N. E.; since 5 P. M. the wind shifting about S. E. to S. W. 9 P. M. wind at West, with very slight drizzling rain and wind in puffs. 15th, wind shifted on the night to W. and N. W. with slight rain in the morning, and blowing hard to the W. a little inclining to N.; half-past nine clearer but wind appears on the increase, wind continued till near 2 strong at times from W. b. N., with heavy clouds. 3, wind lulled and the sun came out, wind rose again at 3½ with dark clouds to the North-West; about 4, it was quite calm with clouds and very close.

I am of opinion there has been a severe storm in Lower Bengal, and although we had but little here, it may help you, even though what I write may be of little worth.

Report from Dinagepore, Lat. 25° 37½′ *N.; Long.* 89° 40′ *East.*—*By* G. Yule, *Esq.*

On the evening of the 14th inst. a heavy bank of clouds was seen rising in the South-East, the rest of the sky being clear. During the night a

moderate breeze arose accompanied by light rain and continued till nearly 7 A. M. of the 15th, when it lulled for an hour and then commenced blowing from the North-East and rapidly increasing in strength as it veered round to the North-West till 3 P. M., at which time it began to moderate, and it ceased almost entirely as it became nearly due West about 6 P. M. Below are the registerings of an Aneroid Barometer of which, unfortunately no note was taken till noon of the 15th, when it was observed to be rapidly falling. Of two common Barometers at the station, one fell to 28.90 the other only to 29.20.

15th noon, Aneroid	29.30	
2 P. M.	29.17	
3 ditto.	29.14	
3½ ditto.	29.11	this was the lowest, and after rising some time
6 ditto.	29.16	here a very slow rain commenced.

Notes from Chilacall, 15 miles N. of Rungpore Civil Station.—Lat. 25° 52′ N.; Long. 89° 39′ E.—By T. SANKEY, *Esq.*

May 15th, 1852.—At sunset last night a heavy bank of clouds rising in the S. W.; commenced raining at 8 P. M., continued all night with Easterly wind blowing hard and in gusts; at daylight rain and ditto wind.

8 A. M.	Ther. 78½°	Bar. 29.51	
Noon	..	.45	Wind N. E. and heavy squalls.
1 P. M.	..	.34	
2 ditto	..	.25	Wind shifting to N. in terrific gusts.
2¼ ditto	76	.23	
2½ ditto	..	.21	N. by E.
3 ditto	75	.15	
3½ ditto	..	.12	
5 ditto	..	.16	The gusts somewhat less violent.
Dusk	..	.19	
7 P. M.	..	.23	
8 ditto	..	.36	
9 ditto	..	.41	Wind going down, succeeded by torrents of rain.
9½ ditto	..	29.45	Squally.

Storm ceased about midnight.

16th May.—Daylight	Bar. 29.55		
2 P. M.	.63	Ther. 86.	
14th May.—2 P. M.	29.67	86	
5 ditto	.58		

Report from Gowalparah, Lower Assam, Lat. 26° 11½′ *N.; Long.* 90° 37′ *E.—By* W. Pollock, *Esq. to Col.* Jenkins, *Agent Govr.-Genl.*

The gale commenced here on the morning of the 15th, at 11 A. M. the sky looking exceedingly cloudy and dark from the Eastward, with the wind from the N. E. and gradually increasing in violence till 2 P. M. when it blew a perfect hurricane, and just about that hour the roof was completely blown off the bungalow usually occupied by the officer commanding the Detachment here, but most fortunately no person was in the house at the time. The wind continued from the same quarter accompanied with heavy rain till 4 P. M when the gale somewhat subsided and the sky looked clear, but in about an hour afterwards the wind commenced to blow stronger than before, but shifted its course from N. E. to N. N. E. and continued strong and steady till 1 A. M. on the following morning (Sunday) when the wind suddenly veered round to the Southward and soon afterwards to the S. W.; the gusts from the S. W. were really awful, and continued with but little intermission till 3 P. M. when the gale gradually subsided. I regret to say that four or five men were drowned in attempting to cross the river, and about forty boats lost, containing a large quantity of salt, rice, &c. &c. the property of the Kyens in the bazar. The most remarkable feature in the storm was its continuing so long and so strong, and so suddenly shifting its course from the N. E. and N. N. E. to the S. S. W. *The gale was not accompanied by thunder or lightning.* The quantity of rain which fell was 3½ inches.

I am sorry to say we have no Barometer at the station, the Thermometer ranged from 74 to 78°, and the weather for the last four or five days has been exceedingly warm. The Ther. 90° in the shade and 128° in the sun at 4 P. M.

Notes of the Gale at Gowhatty, Lat. 26° 10½′ *N.; Long.* 93° 46′ *E.—By Lt.-Col.* Jenkins.

14*th.*—A close and sultry day, sky covered with thin dark clouds, which partially obscured the sun.

At sunrise, Barometer	29.578
9h. 40m.	.596
12 P. M.	.572
2h. 40m.	.479
4 P. M.	.456
Sunset,	.492
Sunrise, Thermometer	78.3
Noon,	82.5
Sunset,	83.5

Prevailing wind N. E.

15*th.*—Very dark and lowering sky, stormy-looking clouds in dark ragged masses. A shower about 5½ A. M., wind from N. E. After 10, wind began to rise, and from 12, blew a gale with heavy rain (which commenced at 1) from the N. E.

Night stormy and wet.

At sunrise, Barometer	29.450
9h. 50m.	.462
Noon,	.427
2h. 40m.	.419
4 P. M.	.380
Sunset,	.320
Sunrise, Thermometer	78°9
Noon,	79.7
Sunset,	78.

No serious damage done by the gale.

Barometrical Observations from Nursingpore in Central India, Lat. 22° 57′ N.; Long. 79° 38′ bearing about W. ¾ S. from Calcutta.—By* C. G. E. Ford, *Esq.*

Some atmospheric perturbation at this station appears to have preceded the Cyclone in Calcutta, as the Barometers suffered some considerable depression on the 12th and 13th, being at Noon on the

11th	28.680
12th	.685
13th	.664
14th	.651
15th	.662
16th	.671

But we can scarcely suppose from the track of the storm that it was in any way connected. To the Eastward on the Coast of Arracan the Barometer does not appear to have been affected either before or during the Cyclone.

I now proceed to give as usual in these Memoirs, the comparative Tables of wind and weather on the different days in which the Cyclone was felt in various parts of the Bay and on its inland progress.

* Its elevation above Calcutta, I am unable to give.

Comparative Table of Winds and Weather, from the 12th to the 15th May, 1851. Sunderbund Cyclone.

Date.	*Name of Ship or Station.*	*Lat. North.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Symp.*	*Ther.*	*Remarks.*
1852. 12th May.	Amazon, ...	16°.41′	85°.07′	8 P. M. gloomy. Noon threatening to midnight. Wind S. Westerly and at midnight North.	Midnt. 29.68 65	29.54 46	86° 86	Lightning to S. Eastward. Confused sea getting up at midnight.
	London, ...	16.40	90.00	A. M. Wind variable. Noon N. East; 4 P. M. N. East. 6, P. M. heavy gales with violent squalls. 10h. 30m. Hurricane, North.	..	..	..	Ship running to S. W. to 6 P. M. Heavy sea. Hove to.
13th May.	Eneas, ...	15 38	85.42	W. S. W. to W. N. W. Overcast Aneroid.	29.75 29.62	29.72	87°	Much lightning all round particularly to S. Easterly, Westerly swell.
	Limehouse, ...	16.42	86.36	A. M. W. N. W.; P. M. West, strong breeze increasing throughout.	29.785	..	82	Heavy head swell. Midnight blowing very heavy. Ship running to the Northward.

Date.	*Name of Ship or Station.*	*Lat. North.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Symp.*	*Ther.*	*Remarks.*
13th May.	Amazon, ...	17°.21′ N.	85°.49′ E.	A. M. N. N. W. increasing; Noon N. W. P. M. W. N. W. West and S. W.	4 A. M. 29.57 Noon .57 4 P. M. .40 10, .50 Mid.48	29.40 .42 .30 .38 .36	85° 82½ 83 83½ 84	Threatening from sunset of the 12th. Noon high tumbling sea. Terrific squalls; kept away to S. S.E. to avoid Cyclone. Midnight hove to.
	London, ...	No observations.		Hurricane; 4 A. M. N. West; 9 A. M. West; 11 A. M. W. S. W.	..	..	..	2.30 A. M. lost mizen-mast and cut away main-mast. Hurricane to midnight.
	Adelaide, ...	19.27	86.15	Noon North; P. M. increasing to a gale; 8 P. M. heavy gale N. N. W.; Midnight N. W. b. W.	Noon 29.57 Midnt. 29.39	Noon 29.25 Midnt. 29.10	86 86	Noon head swell. P. M. the same from Eastward. 8. P. M. bore up to run out of the Cyclone. Running to the S. b. E.
	Precursor, Steam Vessel, ...	15.28	83.01	Heavy dull weather, light North and N. East wind, veering to East and S. East.	6 P. M. 29.68	6 P. M. 29.41	88	Swell from N. W. making preparations for bad weather.
	False Point Light House.	20.19½	86.44	Wind N. East to N. W. at midnight.	29.70	..	86	Squally with cross scud flying, and falling Barometer.

Balasore,.....	21°.28′	87°.00′	S. E. slight rain, cloudy to E. S. E. and E. N. E.	..	..	92	
H. C. F. L. V. Star, Eastern Channel,.....	21.4	88.14	P. M. wind E. b. N. gradually increasing.	..	..	..	
H. C. P. V. Salween, ...	20.56	88.05	Fresh Easterly breeze. Midnight E. N. E.	29.69 to 29.56	..	85 to 86	At anchor in the South Channel. Midnight parted. S. Channel Buoy, W. ½ N. 3.
H. C. P. V. Saugor, Pilot Ridge Station.	20.49	87.49	Daylight threatening. Noon strong E. N. E. breeze. Midnight hard gale N. East.	29.61 to .66 and .53	..	83 85 83	Riding with 210 fs. cable.
H. C. F. L. V. Hope, Gasper Station.	21.26	88.04	8 A. M. fresh Easterly winds. Midnight E. N. E.	29.58 Midnht.	..	..	Heavy sea by midnight.
Easurain, ...	..	..	Wind E. N. E.	29.70	..	..	At anchor off Saugor Flat Buoy, E. S. E. ½ a mile off.
CHANDERNAGORE,	22.51	88.29	A. M. Northerly during the day variable E. N. E. to S. East.	29.68	..	..	Sun rose, very pale, appearing like a large moon.
Katgoorah,.....	23.16½	88.57	A. M. heavy clouds to South, wind S. E.	..	..	..	Strong S. Eastly breeze throughout.

Date.	*Name of Ship or Station.*	*Lat. North.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Symp.*	*Ther.*	*Remarks.*
14th May.	Eneas,.....	17°.49′	87°.05′	W. b. N. to N. W. more from W. N. W.	A. M. 29.62 P. M.55	29 66 .55	.. 85₀	Aneroid A. M. 29.55. P. M. 29.45; 9 P. M. a short sea from N. Eastward felt. Sheet lightning all round.
	Limehouse,.....	17.09	86.20	2 A. M. heavy gale West; 5 A. M. S. W. P. M. W. S. W.; 8 P. M. West; midnight W. b. S. heavy gale.	Noon 29.685 7 P. M. .550 10 P. M. .450	29.30 .. .10	82 80 79	2 A. M. hove to, terrific squalls; 6, bore up heavy cross seas. 10 P. M. hove to again. Incessant lightning.
	Amazon,.....	16.50	87.13	6 A. M. S. W. P. M W. S. W.; 4 P. M. S. W.	29.64	29.56	82	6, Moderating a little but terrific squalls at 7 A. M., P. M. bore up. 4 P. M. Gale much diminished.
	London, ...	16.41	89.40	4 A. M. more moderate W. S. W.; latterly wind S. W.	..	..	..	Ship dismasted and water-logged. Abandoned on the 16th in Lat. 17° 35′ N.; Long. 90° 40′ East.
	Adelaide, ...	18.45	87.23	A. M. N. W. b. W. heavy gale; 4 A. M. N. W.; 5 A. M. W. N. W.; 9 A. M. West. P. M. hard gale.	29.34	29.00	81	Ran to S. b. E. and S. East, and hove to.

14th May.	Precursor Steam Vessel, ...	17°.46′	84°.48′	Squally and dark from N. W. to North and S. East. P. M. veering to S. W. and West and S. S. W. fresh gale at times.	From 29.63 to Noon 29.65 and P. M. 29.70	29.50 29 50 .54	..	Reduced speed at 4 A. M. to avoid the Cyclone. Heavy bank and swell from N. East Set of 65′ to the East from noon 13th. Stood back to the S. East at 9 P. M.
	False Point, Light House, ...	20.19½	86.44	N. W. Noon North; 5 P. M. S. East; 6, S. S. East. Midnight West.	29.52 to .38 and .50	..	..	Steady gale from N. W. to Noon. Gale broken at 6 P. M. Wind S. S. East. Confused sea in the offing.
	Balasore,.....	21.28	87.00	A. M. N. E. Noon North. Stiff breeze N. N. W.; 6 P. M. N. W. Midnight W. N. W. and W. S. W.	29.45 2 P. M. .36 5 P. M. .29 Mid.33	..	..	Heavy dense bank of clouds to the E. N. E.
	H. C. F. L. V. Star, ...	21.04	88.14	Blowing a hurricane veering to N. W. at Midnight.	..	..	..	Barometer stated to have fallen to 28.36!
	H. C. P. V. Cavery, ...	20.49	..	A. M. fresh gale N. E. to East, increasing to a hurricane from N. N. W. to N. West. P. M. N. W. to West; 8 P. M. W. N. W.	29.54 to 28.64 and 29.50	..	..	Standing to sea from Pilot's ridge station. 12 P. M. Cut away mainmast. Barometer rising from 2.30 P. M.

Date.	*Name of Ship or Station.*	*Lat. North.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Symp.*	*Ther.*	*Remarks.*
14th May.	H. C. P. V. Salween, ...	From 20°.05′ to 20.10	88°.05′ 88.06	Daylight gusty N. E. Noon hurricane N. N. E. by 6 P. M. West. Midnight W. S. West moderating.	29.50 to 28.72 and 29.50	80	85	Standing to S. East, and hove to at 8.30 A. M.
	Saugor P. V. Pilot's ridge.	20.49	87.49	Hurricane E. N. E. to N. E. Noon N. E. 4 P. M. N. b. W. Midnight N. West and fast abating.	29.48 to 28.96 and 29.28	..	83 80 81	Rode out the gale on the Pilot's ridge with 210 fms. of cable.
	H. C. F. L. V. Hope. Gasper Station.	21.26	88.04	Daylight strong N. E.; 11, gale at N. E. Noon N. E.; 8 P. M. N. b. W.; at 9, N. W. b. N. Midnight hurricane.	29.60 to 28.98 and 29.70	..	..	Vessel driving at 8 P. M.; Bar. lowest at 8 P. M.
	H. C. B. V. Grappler, ...	At Saugor	..	A. M. fresh E. N. E.; 8, heavy E. N. E.; Noon gale N. E.; 4, N. N. E.; 8, North. Midnight North.	29.78 to 29.72	..	..	At midnight, gale still increasing.

Easurain, ...	..	..	A. M. N. East squally; 10 P. M. to midnight hurricane from North in terrific squalls.	29.60 to 29.40 and 29.08	..	..	At anchor as before. Saugor Flat Buoy.
Diamond Harbour, ...	22°.11¼′	88°.12¼′	From Noon to 6 P. M. blowing violently from East to midnt.	29.45 at 7 P. M.	..	..	Report imperfect.
P. and O. S. N. Compy.'s Ship Hindostan,....	Garden Reach, South of Calcutta.	..	Noon E. N. E. Midnight North.	29.58 Noon 29.03 Midngt.	..	88°	..
CALCUTTA, ...	22°.34′	88°.22′	Daylight fresh breeze N. E. Noon E. N. E. and N. E. 5 P. M. N. N. East; Midnight about North, hard gale.	29.74 to 29.17	.. 29.50	85 82	A. M. heavy bank, East to N. East.
THE SUNDERBUNDS; Berhampooter Steamer.	21.54	89.02	4 A. M. strong Easterly winds to Noon; 4 P. M. E. S. E. increasing. Midnight hurricane, S. S. East.	..	..	..	5.30 P. M every appearance of a gale, ran into creeks for shelter, 2 anchors down. Midnight drove on shore.
THE SOONDERBUNDS; Chunar Steamer.	..	..	From 5 A. M. increasing Easterly breeze; 10.40 A. M. E. N. E. 10 P. M. East gales and terrific squalls, veering South Easterly.	..	..	..	Midnight hurricane, boats swamped, and vessel on shore in the jungles.

Date.	*Name of Ship or Station.*	*Lat. North.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Ther.*	*Symp.*	*Remarks.*
	CHANDERNAGORE,	22°.53′	88°.20′	A. M. wind E. N. E. squally and passing showers; 7.30 P. M. N. E. increasing; 11 to midnight N. N. E.	From 29.50 to 29.47 and 29.00	..	..	Increasing from 7.30 P. M. to strong gale with heavy and frequent squalls.
	KISSENNUGGUR,..	23.26	88.35	Variable N. to East; 10 P. M. E. N. E. blowing fresh and strong squalls. Midnight North furious gale.	..	..	..	..
	KATGURRAH FACTORY, ...	23.16½	88.57	Strong breeze from the East all day; 7½ P. M. increasing; 11 P. M. hurricane. Midnight wind N. E.	..	..	..	..
	RAMPORE BAULEAH, ...	24.22½	88.36	4.30 P. M. A South Easter followed by a stiff gale. Midnight Cyclone commenced from N. East.	29.64 4 P. M.	..	..	..
	JEYPORE BOGORAH, ...	25.15	89.03	9 P. M. till midnight strong increasing Easterly breeze.	..	..	..	..

14th *May.*	BANCOORAH, ...	23.14	87.05	3 P. M. wind in strong puffs from E. N. E.; 5 P. M. wind S. East to S. West; 9 P. M. West.	..	..	..	Night of 13th, Easterly winds in puffs. P. M. 14th May, light drizzling rain.
	DINAGEPORE, ...	25.37½	87.40	Evening a heavy bank of clouds coming up in the S. East. Night moderate breeze and light rain.	..	..	..	..
	GOWAHATTY, ASSAM,....	26.10½	93.46	Prevailing wind N. East.	29.57 to 29.49	..	..	Close sultry day.
15*th* *May.*	Eneas, ...	Pilot Station.	..	S. W. and South.	29.73	29.73	86°	1 A. M. sea increasing very fast, ship standing out to the Eastward about 60′ to get an offing. Sea high from Northward latterly.
	Limehouse, ...	17.59	87.22	S. W.; 8 A. M. S. W. b. W. Noon S. W. more settled.	29.83	29.30	83	Barometer rising and falling to the weather; 8 A. M. Bore up. Confused sea.
	Adelaide, ...	19.27	87.12	A. M. S. W. decreasing gale.	29.58	..	..	Noon fine and strong breeze. Set of 48 miles to the W. b. N.

Date.	Name of Ship or Station.	Lat. North.	Long. East.	Winds and Weather.	Bar.	Symp.	Ther.	Remarks.
15th May.	Precursor Steam Vessel, ...	19.31	87.10	A. M. strong S. S. Westerly breeze. Sea going down.	29.75	29.62	86′	Noon standing on full speed.
	BALASORE, ...	21.28	87.00	6 A. M. S. W. finer breeze and pleasant.	29.50	..	83	..
	F. L. V. Star, ..	20.55	..	A. M. hurricane from N. W.	..	..	..	In 25 fms. water to the W. S. W. of the station.
	Easurain, ...	..	..	A. M. gale N. N. W. heavy sea. 3 A. M. W. N. W. Daylight W. S. W.	1 A. M. 29.20 29.40	..	..	Driving from Saugor Flat Buoy on shore; at 2 A. M. at Saugor Point.
	H. C. B. V. Grappler, Saugor, ..	..	..	From 1.30 to 2.30 gale at its height. 2. N. N. W.; 10.30 S. S. West moderate and fine.	29.21 to.20 and 29.70	..	..	5 A. M. gale moderating fast.
	H. C. F. L. V. Hope, Gasper Station, ...	21.26	88.04	1 A. M. W. N. W.; 2 to 4, moderating.	29.38 to 29.70 at 8 A. M.	..	..	Gale moderate at 5 A. M.

15th May.	DIAMOND HARBOUR, ...	22.11¼	88.12¼	1 A. M. N. W. hurricane to 4 A. M.; 6 A. M. West.	29 54 to 29.55	..	83°	Report imperfect.
	P. and O. C. S. Hindostan, Garden Reach, ...	..	..	2 A. M. N. W.; 4, West to W. N. W.; Noon W. b. N.	28.84 to 29.48	..	75 80	Force of wind not given.
	CALCUTTA, ...	22.34	88.22	4 A. M. wind N. Westerly; 7 A. M. West.	28.82	29.28	81¾	Towards Noon decreasing to fine weather.
	THE SUNDERBUNDS, BAGUNDEE.	22° 38′	88° 57′	Gale at E. N. E. but veering fast to the Southward.	..	..	..	At 2.15 A. M. lull for about ten minutes and shift from E. b. S. to S. West.
	THE SUNDERBUNDS, BERHAMPOOTER STR.	21.54	89.02	Hurricane from S. S. E.; 2.45, veering to the Westward.	..	..	..	Vessel driven on shore.
	THE SUNDERBUNDS, CHUNAR STR,.....	..	..	0.30 A. M. wind veered to South; 4.30, still violent; 6, S. E. moderating.	..	..	..	Vessel on shore, 7.30 got off.
	CHANDERNAGORE,	22.53	88.20	A. M. North; 3, N. W.; 5, W. N. W.; 8, West. Noon W. S. W.	28.90 3 A. M. .65 Noon 29.37	..	..	Increasing in violence; at 3 A. M. a fierce hurricane. At 5 moderating to Noon.

Date.	*Name of Ship or Station.*	*Lat. North.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Symp.*	*Ther.*	*Remarks.*
15th May.	KISSENNUGGUR,..	23° 26′	88° 35′	At 4 A. M. about N. N. W.; 6 A. M. Wind W. N. W.	..	..	..	Hurricane at its height from 2 to 4 A. M. moderating from sunrise.
	KATGORRAH FACTORY, ...	23.16½	88.57	1 A. M. tremendous gale N. E.; 5 A. M. slight lull and veered by North to West; 9 A. M. moderating; 3 P. M. wind high from S. W.	..	..	..	At 1 A. M. trees and houses falling in all directions.
	MALDA, ...	25.03	88.04	6. A. M. strong gale N. N. E. and rain; 8 A. M. increasing N. b. E.; Noon due North. 3 P. M. N. N. W. moderating to 5 P. M. when wind West.	..	..	..	..
	FURREEDPORE, ..	23.36½	89.51	7.30 A. M. S. Easty. gale, veering Southerly.	29.154 to .134 and .474	..	79.8° 78.4 79.4	Gale at its greatest height at 7.30 A. M. On the 14th, moderate breeze, Easterly and N. N. East.

15th May.	RAMPORE BAULEAH, ...	24° 22½′	88° 36′	A. M. wind from N. E.; 2 A. M. North to 1½ P. M. 2 P.. M. N. West; P. M. West; 9 P. M. South.	29.240 7 A. M. 29.636 11 A. M. 29.46 6 P. M.	..	..	..
	JEYPOOR, BOGORAH, ...	25.15	89.03	2½ A. M. rising rapidly to a gale. 6 A. M. hurricane from the N. N. E.; 2½, lull; 4½, wind W. N. W.; 6½, hurricane till 9 P. M.; 10, light breeze S East.	..	..	..	Rain in sheets during the gale.
	BANCOORAH, ...	23.14	87.05	Wind shifting in the night to W. and N. W. slight rain, wind veering by West to North. 4 P. M. calm.	..	..	..	..
	DINAGEPORE,....	25.37½	89.40	7 A. M. lulling for an hour and commenced blowing from the N. East, veering to N. W. by 3 P. M. when moderating.	Aneroid 29.30 to 29.11	..	..	Gale of no extraordinary violence.

Date.	*Name of Ship or Station.*	*Lat. North.*	*Long. East.*	*Winds and Weather.*	*Bar.*	*Symp.*	*Ther.*	*Remarks.*
15th May.	CHILLAKHAL, RUNGPORE,..	25° 52′	89° 37′	A. M. Easterly wind in hard gusts. Noon N. E. and heavy squalls. 2 P. M. North terrific gusts; 2½, N. b. E.; 5 P. M. moderating.	29.51 to 29.16 and 29.45	..	..	Sunset 14th, heavy bank of clouds to the S. West. Storm ceased about midnight of 15th.
	GOWALPARA, ASSAM,.....	26.11½	90.37	11 A. M. N. East, increasing to hurricane at 2 P. M.; 4 P. M. moderating but renewed at N. N. E.	..	..	..	1 A. M. 16th, veered to South and S. W. blowing a hurricane with gusts, and moderating at 3 P. M.
	GOWHATTY, ASSAM,.....	26.10½	93.46	A. M. N. E. Noon gale to midnight.	29.45 to 29.32	..	78° to 79	

Part II.—Remarks.

I now proceed to detail the considerations from which the tracks of the Cyclones are laid down, and to add a few remarks on the phænomena of the principal one.

On the 12th May.—We have, first, the unfortunate ship *London* with a fresh N. East breeze, to which she could just carry her main top-gallant sail, running 8½ knots to the S. W. or in the N. W. quadrant of her Cyclone, which before midnight was a tremendous hurricane obliging her to heave to at 10 hours 30 minutes P. M. when the wind was veering to the Northward and N. West, so that the ship in the 80 or 90 miles of run which she had made to this time had crossed in front of, and forced herself close in towards the centre ; and at 2.30 A. M. of the 13th, lost her mizen mast by one of the terrific squalls from Northwest, which she would of course find there. If we allow the wind to have been North at 10 30 P. M. when the ship hove to, and that the centre then bore East from her at a distance of 25 miles ; the most we can allow, seeing how rapidly the wind veered with her from this time; this will place it at this hour (10.30, P. M. 12th) in Lat. 15° 7′ N. Long. 89° 20′ East, and if it was the same Cyclone as that which afterwards passed up over the Sunderbunds, it was travelling up at the rate of eight miles an hour, since it passed the station of Bagundee (see p. 425) at 418 miles N. ½ West distant from this position at 2 30 A. M. of the 15th, which gives an interval of 52 hours. None of the other ships were near enough at this time I should consider, to feel the effects of the Cyclone as to wind, though the sea and gloomy weather and their Barometers were all giving warning on the following day.

13th May.—We have on this day the *Precursor* Steamer though far to the Westward, and the *Eneas* on the same parallel, but three degrees farther to thr Eastward with gloomy and threatening indications sufficient to induce them, very properly, to make due preparations, and farther to the Northward we have the *Limehouse* with a heavy head sea and the wind (not marked at Noon but before it, W. N. W. and P. M. West) about W. by N. the gale constantly increasing. The *Amazon* to the N. W. of her has at noon strong breezes from the N. W. with torrents of rain and finally so many indications of a Cyclone to the N. East of her, that she is very properly kept away to the S. S. E. to avoid the centre. The winds of both these ships were probably influenced by the vicinity of the shore and by the monsoon, to which, also the high Barometer of the *Limehouse* may be owing ; and if we admit the *London's*

Cyclone, which was an undoubted one, to have been *the* Cyclone which travelled up to the Eastward of the Light vessels and over Bagundee, and this appears to me to be its probable track—we shall be unable to reconcile any centre upon this track, taking also the known rate of travelling which we have assigned above with these ships' positions and winds.

I have therefore assumed that there were on this day, and for part of the 14th, two Cyclones, the main one being the *London's*, which certainly was, during the whole of this day, a furious tempest with that ship, passing off at a moderate rate of progression to the Northward; and the smaller one being that indicated by the winds of the *Amazon* and *Limehouse* only; of which the centre seems to be in Lat. N. 17° 49′ Long. 86° 38′ and being of so small an extent that it did not reach the position of the *Adelaide* on this day at noon. And there is nothing new in this assumption for we know, that these in-shore Cyclones hereabouts, while larger and heavier and perfectly formed ones are blowing in the Bay, are quite common. It would seem indeed that as in a former instance (XXIII. Memoir, Journal, Vol. 23rd, p. 505) the minor of the two Cyclones, or in other words the absorption of the small one into the larger, occasioned some disturbance in the regularity of the wind at False Point Light House, for we find that there were not only two distinct scuds S. East and S. W., but that moreover the wind veered from East to North settling to a steady gale at N. W. till noon of Friday the 14th, when it changed to North, and at 5 veered again to S. East breaking up at 6 P. M. in a S. S. E. and finally a Westerly breeze.

For the main Cyclone on this day we have no other position than its calculated distance on the line of track at eight miles per hour which will place it in Lat. 17° 25′ N. Long. 89° 15′ East, and we shall see also that this line of track and rate of travelling agrees on the 14th, with the times and direction of the winds experienced by the Floating Light Vessel, and *Salween*, P. V. at the Sand Heads.

14th May.—If we take for this day on the line of the main or *London's* Cyclone, the same rate of travelling as before, viz. six miles per hour, for the twenty-four hours, we shall find that the centre falls on a spot in Lat. 20° 38′ N. Long. 89° 03′ East or forty-four miles to the S. East of the Floating Light Vessel's station, and that this position with the line of the track which we have assumed, agrees with the rapid veering of the wind after Noon of this day as shewn by the capital Log of the H. C. P. V. *Salween*. It also agrees with the wind at Calcutta, at Saugor, Balasore, False Point and the Pilot Vessels on the Ridge, but it does not appear to have reached so far as the position of the *Adelaide*

on its S. Western quadrant which ship, up to noon this day, had evidently sheered round the Western and Southern quadrants of the in-shore and smaller Cyclone as will be seen by the rapid veering of the wind with her. And the proximity of it to the large one fully accounts for the oscillation of the *Adelaide's* Barometer so well and so carefully observed by Capt. Stephens. We have also to take into account here that the S. W. monsoon which was blowing strongly along the coast was adding its force to this quadrant of the Cyclone. The distance, and the bearing of the centre of the main Cyclone, would give the *Adelaide* at most a moderate gale at N. W. or one of no greater strength than the strong squalls and puffs experienced at Calcutta at the same distance North of the centre at this time, whereas we find her with a hard gale at W. S. W. reducing her to storm trysails and evidently a part of the in-shore Cyclone as marked.

On the 15th May. We find the centre of the main Cyclone reaching Bagundee at 2h. 15′ A. M. on this day, and passing over the Station House with about two minutes' lull; so that we may say that the true centre was at Bagundee at about 2h. 20′. A. M. an interval of (14h. 20′) fourteen hours twenty minutes, since Noon of the 14th; which at eight miles an hour would give about 115 miles. The distance measured on the Chart is about 120 miles, and this position and rate of travelling will also be found to agree, almost exactly, with the winds experienced by the Floating Light at the Gasper Station and by the Grappler Buoy Vessel at Saugor.

But in advancing inland to the N. b. East from Bagundee the Cyclone seems to have increased its rate of travelling, though in some degree to have moderated its fury; for, passing over the Katgorrah report which being only at thirty-eight miles distance and the exact time of the passage of the centre not being ascertainable from the brief notice which we have from that factory, we have fortunately from Mr. Payter at Jeypoor to the N. N. W. of Bogorah very clear and sufficiently exact data to enable us to say that the centre passed there about 3 P. M. of the 15th, which would give 12 hours and 40 minutes for the elapsed time, since its passage over Bagundee at 2h. 20′ A. M., the measured distance between these two positions being 148 miles; which will give 11.7. or eleven miles and three quarters per hour as its inland rate of travelling, while as we have seen it was only eight miles when at sea. It is thus an instance, and I think a solitary one, of a Cyclone *augmenting* its rate of travelling when it reaches the land. Was this owing to the junction of the smaller in-shore Cyclone of the *Limehouse* and *Amazon?*

We have no data which will enable us to follow the centre accurately

farther to the Northward and Eastward, though there is no doubt that it was felt severely in the district of Rungpore, and Eastward into Assam, but I have not carried the track beyond Jeypoor Bogorah on the Chart. I have however measured back from that station over which the centre passed at 3 P. M. 35.2 thirty-five miles, being the distance, at 11.7 miles per hour, of the centre South of Jeypoor at Noon, for its position on that day, which it will be seen falls in Lat. 24° 28′ N. Long. 89° 03′ East, giving a N. N. W. wind at Rampore Bauleah and an E. N. E. one at Chilakhal which taking into account the vicinity of high lands and the known irregularities of shore-winds are near enough* for inland reports. The singular fact related in Mr. Cooper's Jessore report of the fall of the trees in opposite directions on an East and West road, whereas the track of the Cyclone was nearly North and South, is a beautiful exemplification of the puzzling shifts of wind which so much embarrassed our forefathers.

Part III.—Of other Phænomena.

Thunder and Lightning.—The question of the Thunder and Lightning experienced in any part, or at any time, of a Cyclone is always one of much interest. We find that the *Eneas*, *Limehouse*, *Amazon*, *Adelaide* and *Precursor* had all lightning more or less; the *Limehouse* indeed had it of an excessively vivid description, but whether this occurred when the disturbance occasioned by the junction of the two Cyclones took place, we cannot exactly affirm. In the Bagundee report, Mr. Crank, distinctly states that there was no thunder or lightning, nor is there any particularly noticed in any of the inland reports, except from Malda where the lightning was seen at a distance, and the absence of it is also specially stated from Rampore Bauleah.

Earthquakes.

There is no room, I should think, to doubt that Mr. Crank has fully established for us that in this instance at least, and at the centre of the Cyclone, earthquake shocks were experienced; his peculiar situation in being with his family in a small brick built edifice intended for a pig-stye and his frequent experience of earthquakes in other parts of the world† give us the best assurance that he could not be mistaken, as persons residing in houses of one or

* There is some discrepancy in the Rampore Bauleah report, and the table at the foot of it which I cannot reconcile.

† This is more important than would be supposed: I have also lived some years in *earthquake countries* and can usually distinguish shocks much sooner than persons who have not that experience.

two stories where every thing is vibrating by the force of the wind might be, unless the shocks were very strong and sudden. Some reports also reached me that some of the pensioners and Commissariat Officers who reside at Cooly Bazar,* where the houses are all lower-roomed ones only, had also experienced shocks of earthquakes, and I sent a paper of queries for circulation amongst the occupiers of these houses, but only one person clearly and distinctly stated that he had experienced a shock of an earthquake between 12 and 1 A. M. of the 15th, in that locality.

Banks of Clouds.

It will be noticed that in the Balasore, Pooree (Cuttack), Dinajpore, and other reports the Banks of Clouds indicating the position of the passing or approaching Cyclone, were very distinctly seen, so that had these been ships at sea they would from this sign alone, have had ample and timely warning to take all necessary precautions.

Electric Noises.

Mr. Crank's report of these singular and appalling sounds is, I think, conclusive when taken with what I have brought together in the Horn Book, p. 179, regarding the noises heard on the approach and at the passage of the centre of Cyclones,) as to their being electric phenomenæ? but the peculiar interest of Mr. Crank's report is that it corroborates on shore what we have such ample evidence of at sea. That my readers may not suppose there is any exaggeration in this gentleman's account I copy here from Luke Howard's Climate of London, Vol II. p. 151, in a description of the October Cyclone of 1811, as experienced off Halifax by H. M. S. Tartarus and three other men-of-war, the following passage, "I would if possible give you a description of the noise occasioned by the hurricane but I am unequal to the task: if you can conceive however all the savage animals of the brute creation assembled to affright mankind by their roaring you will have some faint idea of the deafening variety of sounds in the tempest we have experienced!"

The report from Cuttack will also be found to afford some remarkable electric evidences.

* A suburb of Calcutta about one mile to the south of the forts on the banks of the river.

Literary Intelligence.

The Rev. Mr. Long's Catalogue of Bengali Books furnishes much useful information which has not hitherto been accessible. It is but an abstract, however, of a larger one now in the press, and which will be of greater interest. The Catalogue confines itself to printed books, which however may be supposed to comprehend all Bengali compositions of any interest. Apparently the oldest work in MS. yet discovered is the Tippera Raj Mala, an analysis of which was given by the industrious author of this Catalogue in vol. 19 of our Journal, but the authenticity of this work was not beyond doubt, and unfortunately the Rajah, notwithstanding the kind exertions of Mr. Metcalfe on our behalf, would not allow us the satisfaction of examining the original MS.

Dr. Sprenger has, on the recommendation of the Supreme Government, obtained the permission of the Hon'ble Court of Directors to complete his Catalogue on the extended plan adopted in his 1st vol. It is stipulated, however, that the work is not to exceed 5 vols.

Dr. Röer has kindly placed at our disposal some letters from Berlin, from which the following translations are extracts.

"Dr. Steinthal has published an excellent work "Grammatik, Logik and Pschychologie, ihre Principien und ihr Verhaltniss einander." It is said, that he is to go as French consul or interpreter of the consul to China; for the last two or three years he has studied Chinese in Paris. A. Regnier, a disciple of Burnouf, has published a very able and exhaustive paper on the Vedaic language, in connexion with another "on the formation of Greek nouns." We may expect a new edition of Bopp's "Vergleichende Grammatik" and an English translation of it by Austin (?) (Hertford), which is to appear at the same time. The third volume of Lassen's "Indische Alterthums Kunde" is about to be printed at Elberfeld. Dr. Pertsch is preparing an edition of the Taittiríya Áraṇyaka for which he has collected materials in England. I suppose, Baboo Rajendra does not intend to include this in his edition of the Taittiríya Bráhmana. It would be a great pity, if two editions of the same work should be published."

Baboo Rajendra always intended to include the Áraṇyaka in his edition of the Bráhmaṇa, which would indeed be incomplete without it. Our Society's project for publishing the Black Yajur has been no secret for the last three years, and this announcement cannot require from us any modification of it. The translation of Bopp referred to in the letter must be Eastwick's, part of which has already appeared.

From a letter from Dr. Weber, dated 11th May.

"Roth's and Whitney's edition of the Atharva Veda has appeared. It is very elegantly printed. Benfey has published a new Sanskrit grammar, more compendious than his former one. Four numbers of the 4th volume of Vrahm's Journal "Fur vergleichende Sprach forschunz," are out; Stenzler prepares an edition of Páraskuras Grihyasútras. The edition of the Zendavesta by Westergaard embraces all the texts. Spiegel is printing a Huzváresh (Pehlvi) grammar (in Vienna). He has finished his translation of the Zend texts in MS. but not in print; the same is the case with his edition of the text. A Demotic grammar by Dr. Brugsch has been published by Messrs. Dúmmler; the types are all new, and it is a master-piece of typography."

We extract the following from a letter from Professor Wright of Oxford to Lieut. Lees.

"I presume you are acquainted with all the recent publications in our particular department. In case however it should be otherwise, I will call your attention to Kosezarten's edition of the Dewan of the Hudhailite Arabs ديوان الهذليين, to N. v. Tornamo's "Moslemische Recht," and to Amari's "Storia dei Musulmani di Sicilia." This last promises to be a very valuable work, a side piece to Dozy's Recherches sur l'histoire de l'Espagne. The publications of the Parisian Asiatic Society are progressing well; the 3rd vol. of *Ibn Baṭuṭah* is in the press, and I believe the first of *Al-Mas'údí.** The 2nd vol. of Juynboll's Abú 'l-Mahásin is likewise out. It may in-

* Lieut. Lees informs us on the strength of late advices from Paris (M. Mohl, dated 16th August) that the printing of the "Meadows of Gold"—which had been interrupted by the temporary employment in the Imperial Library of the Editor was rapidly progressing, one-half of the 1st Vol had been printed.

terest Sprenger to know that a pupil of Fleischer's, by name Ralfs, is preparing an edition of the Burdah قصيدة البُردَة

"If you are acquainted with any MS. of the *Kámil* of *al-Mubarrad* الكامل للمُبرّد in India, will you kindly inform me of it. I am preparing an edition of this large grammatical work, which contains also much old poetry and many valuable historical data. At Leyden I copied one fine MS.; this I have collated with one lent me by Dr. Sprenger (very bad), and one at Cambridge (tolerable). There is still a 2nd at Cambridge for me to go through.

"I may mention finally that there is a chance of an edition of the well known poems المُفَضَّلِيَّاتُ. In the last collection purchased by the Berlin Library there is a fine MS. of these poems, and Dr. Josche, one of the Curators has obtained from me the loan of my copy of the MS. in the British Museum for the purpose of collating it."

From Mooltan a letter from Lieut. Raverty contains the following announcement.

"There is a celebrated shrine here of Bhanal Hak whom Shaik Sadi visited at Mooltan. I am getting all the accounts I can concerning it. They say here that the original copy of the Gulistán written in Kufic and in red ink was given to Bhanal Hak by the author, and that it is still in the possession of some parties in the Mooltan District!! I am trying to find out."

The writer is just bringing through the Press the last sheets of an excellent Pushto Grammar after publishing which he will give his attention to the Brahooi language.

The N. W. Series to which we alluded in a former number is to consist of selected Mohammedan histories. From a lithographed invitation circulated with a view to purchasing or borrowing MSS., we find that the selection is as follows:

Ferishtah.
Kholasut ool Towarikh.
Chuch Nameh.
Tarikhi Sind.
Turjumah tarikhi Yemíní.
Tabkati Nasiree.

Ferozshahee—Zeea Burnee.
Ditto—Shums Sooraj.
Iutikhab Zufur Nameh.
Mukhzun i Afghanee.
Muutukhub ool Lubab.
Tarikhi Chagatai.
Wakiyat i Baberi.
Ditto Humayoon.
Akbur Nameh.
Intikhab i Tarikhi Budaonee.
Zoobdat ool Towarikh.
Masir i Ruheemee.
Masir i Alimgiree.
Jahangeer Nameh.
Badshah Nameh.
Hadikat ool Safa.
Abrut Nameh.
Tarikh i Iradut Khan.
Tarikh i Nadir ool Zamanee.
Siyar ool Mootakhereen.
Tarikh i Moozufferi.
Muntukhub ool Towarikh.
Hadikat ool Akalim.
Oosaf.
Tozuk i Timoorie.

It is not intended to publish all these works. These are to be collected for deposit in the Government Colleges and the more important of them and selections from some of them, such as the Muntukhub ool Towarikh, Tarikh i Moozufferi and other general Histories will appear in the Series. Parties lending MSS. for collation will be presented with a copy of the work when printed.

It is indeed high time for the credit of British rule in India to collect these historical materials, when we find native geutlemen admitting to Mr. Hammond, who is to superintend the publication of the Series, that "numberless valuable libraries have been sold as waste paper to druggists and makers of fireworks!" This project, which has been already commenced, a copy of Zeea Buruee's Feroz-

shahee having been prepared for press, is a part of the greater one to carry out which poor Elliott overtaxed himself, and which will yet it is to be hoped be matured and completed under competent management at home.

The plan which Lieut. Lees, assisted by the Moulvees of the Madrasah had formed for publishing al-Zamakhshari's commentary on the Qoran has been so far modified as to include the publication of the text of the latter, which will be given with the *ramooz awqaf* or stops between the verses. Underneath this will be printed the above commentary entitled the Kashshaf, to furnish which six or seven copies of the work, some of them of very old date, have been collected from various parts of India. The 1st vol. will, it is hoped, appear in a few months.

Lieut. Lees is also engaged on an edition in 2 vols. 8vo. of the Tarikh-al-Khalfa by the celebrated Soyootee, being the history of the Arabian Khalifs from the commencement of the reign of Aboo Bakr, while he has nearly ready for publication a Persian work, the Araish i Bozorgan, which is an obituary with short biographical notices of some 250 Mohammedan saints. This is a compilation from numerous authors whose works are not procurable in India or Europe. Moulvee Kabir oodeen Ahmed has given his assistance in editing this last work and Moulvee Abdool Hak is engaged on the Tarik-al-Khalfa.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL,

FOR JULY, 1855.

The usual monthly general meeting of the Society was held on the 4th instant at half-past 8 P. M.

SIR JAMES COLVILE, KT. President in the chair.

The proceedings of the last month were read and confirmed and the accounts and vouchers for the months of February, March, April and May laid on the table.

Presentations were received—

1. From the Private-Secretary to the Hon'ble the Lt. Governor of the North Western Provinces, Meteorological Observations made in November last at Dadoopore, Boolundshahar, Mussooree, Roorkee, Hansi, Allighurh, Meerut and Umballa, in reply to the request made for such information on behalf of M. Leverier of the Paris Observatory.

2. From the Imperial Society of Agriculture, &c. of Lyon, its Annals for the year 1852-53.

3. From the Linnean Society of Lyon, its Annals for the year 1852-53.

4. From the Imperial Academy of Sciences of Lyon, its Memoirs for the year 1852.

Pursuant to notice given at the last meeting, Mr. Houstoun asked whether he might be allowed to see and have access to all papers the property of the Society.

The chairman referred Mr. Houstoun to Bye-law 101, and stated that under that rule the Journal books of the Society and of the Council, were open to the inspection of any ordinary member during office hours. After some discussion, Mr. Houstoun moved that, "he may be allowed to see and have access to all papers the property of the Society." As an amendment to which Dr. Walker moved that the

question, being one of importance, should be referred to the Council for report under Bye-law 45.

The amendment was carried.

The following gentlemen, duly proposed and seconded at the last meeting, were balloted for and elected ordinary members.

W. S. Atkinson, Esq. Principal of La Martiniere.

T. Loch, Esq. C. S.

Lt. R. Stewart, 22nd N. I. Kachar, was named for ballot at the next meeting, proposed by Lt. Bivar and seconded by the Secretary.

A letter from Lt. Bruce, H. M. 29th Regt. communicated his wish to withdraw from the Society.

In accordance with the notice given at the last meeting the President announced that, under the 60th Bye-law, the Council have elected Dr. Spilsbury as a Vice-President, and Capt. James and Mr. Bayley as members of their body, in the room of Col. Baker and Capt. Thuillier resigned.

The President moved that these elections be confirmed.

The question was put and carried.

Communications were received—

1. From Mr. Under-Secretary Morris, announcing that His Honor the Lt. Governor has been pleased to accede to the Society's request for a grant of Rs. 1,200, for paving the basement story of the Museum with Chunar flag-stones.

The President proposed that the best thanks of the Society be conveyed to His Honor the Lt. Governor for this mark of his consideration. The question was put and carried.

2. From Bábu Rádhánáth Shikdar enclosing abstracts of the hourly Meteorological Registers kept at the Surveyor General's Office, Calcutta, for the months of March and April last.

3. From Lt. G. H. Raverty, forwarding an account of a visit to the shrine and town of Sakhi Sarwar in the lower Dirajat, with a notice of the Annual Melá or Fair held there.

4. From Bábu Rájendralál Mittra, submitting a note on two inscriptions from the Island of Putu in the Chusan Archipilago.

5. From Rev. J. Hislop, communicating a paper on the age of the coal strata in Western Bengal and Central India.

The Librarian and the Curator in the Zoological Department having submitted their usual monthly reports, the meeting adjourned.

Report of Curator, Zoological Department, for July, 1855.

1. The first contribution which I have now the pleasure of bringing to notice is that of two fine (and nearly perfect) skeletons of the *Mias Rambi* Orang-utan (PITHECUS BROOKEI, nobis, *J. A. S.* XX, 375); presented to the Society by Sir James Brooke, K. C. B., Governor of Sarawák.

The skeletons are those of a fully adult but not aged female, with the epiphyses of the limb-bones well anchylosed, yet with sagittal crest undeveloped,—and of a nearly full-grown male, with incipient sagittal crest, but with the epiphyses of the limb-bones more or less detached and exhibiting other proofs of incomplete growth. In both specimens, the third or last permanent grinders had been brought into wear; the amount of attrition being considerable in the female, and much less so in the male.

As from the structure of the pelvis and certain other characters, no doubt whatever can exist respecting the sexes of these two individuals, we accordingly obtain the requisite data for deciding upon the sex of the skeleton of an adult *Mias Pappan* which was presented on a former occasion to the Society; and can now pronounce, with confidence, that the latter was a male animal, and moreover it appears from accumulating evidence that the *Mias Pappan* is a smaller auimal than the *Mias Rambi*, the adult female of the former corresponding in size with the adult male of the latter; the male of the *Rambi* (to judge from its skull) being much larger.

Individuals, however, of each may vary in size; as the skull of the female *Rambi* now sent is considerably larger than that of the much older female *Rambi*, with high sagittal crest, figured in plates 3 and 4 attached to the memoir upon this genus in *J. A. S.* Vol. XXII. A distinguishing sexual feature would appear to exist in the conspicuously greater breadth of the orbital ring exteriorly (especially its malar portion) in the male, and also the greater breadth of muzzle in the adolescent male, and the general appearance of massiveness, indicative of its future growth, as compared with the skull of an adult female. In our huge old Sumatran male, the extent of grinding surface of the series of upper molars (including bicuspids) is $2\frac{1}{4}$ in.; in the young Bornean male now sent, $2\frac{5}{16}$ in.: the anterior bicuspid of the latter being somewhat pushed forward outside of the hind margin of the canine, and the interspace between the canine and outer incisor being but half as great as in the fully developed animal. In both females, the same grinding surface is but $2\frac{1}{8}$ in.; and in the adult male *Pappan*, intermediate, or $2\frac{1}{4}$ in. This male *Pappan* (as

now determined), to judge both from the degree of attrition of its molars, and that of *anchylosis*, was a somewhat (but not much) younger animal than the female *Rambi*, and considerably more mature than the adolescent male *Rambi:* both of the former, however, had certainly attained their complete growth, and we observe a marked difference in the proportions of the limbs, which alone would go far to remove any doubt of the distinctness of the two species.

The extreme length of humerus of the adult male *Pappan* is $14\frac{1}{4}$ in., and of ulna $14\frac{1}{2}$ in.; in the adult female *Rambi*, respectively $14\frac{1}{2}$ and 15 in.: femur of male *Pappan* $10\frac{5}{8}$ in.; of female *Rambi* $11\frac{1}{2}$ in.: tibia of former, $9\frac{1}{8}$ in.; of latter, $9\frac{5}{8}$.

The total length of pelvis in the female *Rambi* is 11 in.; extreme breadth apart of the ilia $11\frac{7}{8}$ in.; of pelvic aperture (measured behind) $3\frac{1}{8}$ in.: the corresponding measurements in the male *Pappan* being respectively $9\frac{5}{8}$ in., $10\frac{3}{8}$ in., and $2\frac{7}{8}$ in.

A more detailed comparison must be deferred until we can get the female *Rambi* skeleton mounted. At present, we may remark that our great Sumatran male *Rambi* skull (Vol. XXII, plates 1 and 2,) about corresponds with Prof. Owen's great Bornean *Rambi* skull, figured in *Tr. Zool. Soc.* Vol. 2, pl. 31; only that the supra-orbital ridges are less flatteued back, and the profile consequently is more concave: while the Bornean female *Rambi* now received would correspond with Prof. Owen's Sumatran (?) female, figured in *Tr. Zool. Soc.* Vol. 1, pl. 53, were it only much older, and had it its sagittal crest developed; its lambdoidal crests are remarkably developed. In the adolescent male *Rambi* skull, it is remarkable that the nasal bones continue distinct (which is unusual in this genus, even in the half-grown animal); the two being but very imperfectly united, and the same is observable in our adolescent female small Orang skeleton with comparatively short fore-arms. In our adolescent male *Rambi*, the nasal bones do not ascend upon the *glabella* as in our other *Rambi* skulls.

2. T. C. Jerdon, Esq., Ságur. Specimen of a new Indian species of Swallow, belonging to the group of 'Republican Swallows' (PETROCHELIDON of the Prince of Canino), and having similar habits to the well known HIRUNDO FULVA of N. America. The specimen is not a good one to describe from, being not fully mature; but its upper-parts should be glossy black, with white lateral edges to the dorsal feathers more or less seen: the rump brownish; and crown dark rufous: lower-parts white, with black mesial streaks to the feathers of the throat and breast; the under surface of wings pale brown: tail slightly furcate, with a slight whitish spot more or

less developed towards the tip of the inner web of most of its feathers: tertiaries also whitish-tipped. Length about $4\frac{1}{2}$ in., of which tail $1\frac{3}{4}$ in.; wing $3\frac{1}{2}$ in.—HIRUNDO FLUVICOLA, nobis, *n. s.* "This interesting new retort-nest building Swallow," writes Mr. Jerdon, "I discovered during a late trip, and found it only in two spots, building in company; the nests crowded together on rocks overlying the rivers (Sonar and Kane) in Bundelkund. It was then breeding (April and May), but I could not get at the nests." A rough sketch of the latter is sent, representing "retort-nests" with short necks, and crowded together, similar to those of the American H. FULVA, Vieillot (v. *H. brunnifrons*, Say).

3. From Major A. P. Phayre, Commissioner of Pegu. A collection of skins procured in the course of a recent tour through that province.

Of mammalia, are sent the skin of a Jackal, that of a Hare, and those of three species of Squirrel.

The Jackal (CANIS AUREUS) was shot at Meaday by Lt. Bosworth of the Bengal Artillery, and (as remarked by Major Phayre)—"has set at rest the question of that animal being found in Burmah or not."

The Hare is not LEPUS SINENSIS (as supposed from the much discoloured fragments of a skin, noticed *J. A. S.* XXI, 359); but is of a peculiar and hitherto undescribed race, which may be designated

LEPUS PEGUENSIS, nobis, *n. s.* Very similar to L. RUFICAUDATUS, Is. Geoffroy, of Bengal, and all Upper India, Asám, &c.; but at once distinguished by having the tail black above, as in the generality of the genus. The upper-parts are of the same colour as in the Bengal Hare, but contrast directly with the pure white of the belly, instead of passing to it through fulvous as in the other; and the limbs also shew but a slight fulvous tinge, with white hairs intermixed, especially on the hind-limbs where the white predominates: the chin and throat (in fact the fur over the whole lower jaw) are conspicuously white; and the short sparse hairs on the outside of the ears are whitish,—except in front, and also the tip posteriorly, whereon is a large blackish terminal patch. The fur of the upper-parts is pale dusky-grey at base, then black, and finally bright fulvous-brown with black extreme tips: towards the tail above is a strong tinge of ash-colour. Size, proportions, and structure, as in the common Hare of all Upper India.*

* Of the Hare from the vicinity of Dacca referred to by the name L. TYTLERI in the *Ann. Mag. N. H.* for September, 1854, p. 176, the Society possesses a specimen presented by Capt. Robt. Tytler, of the 38th N. I. (*J. A. S.* XXII, 415); but we can perceive in it no distinction from the common L. RUFICAUDATUS, stated also by Capt. Tytler to inhabit the same district.

The three species of Squirrel sent are the large SCIURUS BICOLOR,—Sc. KERAUDRENII,—and Sc. PYGERYTHRUS. The first abounds throughout the Burmese countries and the Malayan peninsula, and northward to the Asâm hills and those of Sikim and Nepal: but its pale variety we have only seen from the Malayan peninsula. Himalayan specimens *(Sc. macrouroides,* Hodgson,) have longer fur on the ears, but present no further difference that we can perceive; and even this may be merely seasonal. Sc. KERAUDRENII is common in Arakan: and we recognise in Sc. PYGERYTHRUS a species formerly sent from Rangoon by Dr. Fayrer, being the supposed variety of Sc. LOKROIDES noticed in *J. A. S.* XXII, 414, and distinct from the presumed variety of Sc. PYGERYTHRUS formerly sent by Major Phayre from Moulmein, which is described *J. A. S.* XVII, 345, and may now stand as Sc. PHAYREI, nobis, *n. s.**

* The multiplicity of small Squirrels with mostly annulated or grizzled fur, inhabiting the Burmese and neighbouring countries, are most difficult to discriminate. Of the group of gigantic Squirrels, there is only Sc. BICOLOR (and its pale variety in the Malayan peninsula); and of that of small striped Squirrels, only Sc. BERDMOREI, nobis (*J. A. S.* XVIII, 603), and Sc. BARBEI, nobis (*J. A. S.* XVI, 875), that we know of as yet,—though Sc. INSIGNIS, Horsfield, is likely to inhabit the more elevated interior of the Malayan peninsula: but the other small and medium-sized Squirrels seem almost interminable; and we have the following series in our museum, which may be briefly indicated with advantage, for the benefit of students.

1. Sc. RAFFLESII, Vigors and Horsfield: *Sc. Prevostii*, Desmarest. Larger than *Sc. hippurus*. Black above, deep rufo-ferruginous below and on the feet; a very broad white lateral band from mouth to haunch, extending over the outside of the thigh, and more or less greyish from cheek to shoulder (inclusive): tail of a somewhat duller black than the back, and a little rufescent at tip. Inhabits the Malayan peninsula.

Remark. A nearly affined race inhabits Borneo, which is the Sc. REDIMITUS, Van der Boon, and when half-grown—*Sc. rufogularis*, Gray, erroneously (in all probability) supposed from China. This race has blackish cheeks and rufous shoulders; a grizzled band, formed of whitish-tipped hairs, above the white lateral band, and this grizzling is continued over the haunch and hind-limb: the tail also is much grizzled with white, in a specimen presented by the Batavian Society to our museum. Of very numerous examples of Sc. RAFFLESII (from the Malayan peninsula) examined, we have observed no remarkable variation, nor tendency to assume the distinctive colouring of Sc. REDIMITUS: but Sc. RUFONIGER, Gray, is probably a mere individual variety of the former, especially as Malacca is given as its habitat. It is thus briefly described:—"Black; throat, inner side of legs, and beneath, bright red; an indistinct streak along each side, and the outer side of the thigh, white, grizzled." *Ann. Mag. N. H.* X, 263 (1842).

Among the birds, we observe, with surprise, an unmistakeable specimen of the common British Meadow Pipit (ANTHUS PRATENSIS) in its summer plumage. We have never seen this bird from any part of India, though Mr. Gould states it to occur in the west (*P. Z. S.* 1835, p. 90).

By Dr. S. Müller, and also by Dr. Cantor, the Malacca and Bornean races are considered as mere local varieties of one species: but the application of this principle of classification to many of the following races could only be most arbitrary).

2. Sc. HIPPURUS, Is. Geoffroy: *Sc. rufogaster*, Gray; *Sc. castaneoventris (?)*, Gray, the young? Much larger than the common British Squirrel. Lower-parts and inside of limbs deep rufo-ferruginous; head, shoulders, and sides of limbs, dark grizzled ashy; rest of upper-parts, with base of tail, deeply tinged with rufous, and also grizzled,—contrasting much with the dark leaden-grey of the cheeks and limbs externally: rest of tail dullish black; and feet nigrescent. Common in the Malayan peninsula, Sumatra and Java. We have seen very numerous specimens from the first named region, but *no variation* whatsoever.

3. Sc. ERYTHROGASTER, nobis, *J. A. S.* XII, 972: *Sc. hippurus* of Asám, *auctorum*. Upper-parts *uniformly* of nearly the same dark grizzled ashy as the head and outside of limbs of the preceding race; this grizzling extending about half-way along the tail, the remainder of which is dull black: feet nigrescent; and lower-parts deep rufo-ferruginous. Inhabits the Munnipur hills, and those E. and S. of Upper Asám.

4. Sc. ERYTHRÆUS, Pallas: *Sc. hippurus*, var., McClelland and Horsfield. Colours nearly as in Sc. HIPPURUS, but duller and more blended; the rufo-ferruginous hue of the belly contrasting abruptly at the sides of the body (whereas in Sc. HIPPURUS the sides are so rufous that the contrast is much less decided): ears bright rufous; and the terminal two-thirds or more of the tail are nearly of the same colour as the belly, the tip generally being paler. There is also more or less rufous about the muzzle. Inhabits the Khásya hills, and neighbouring mountains of Lower Asám.

(N. B. Sc. ERYTHRÆUS is described to have slightly ciliated ears *(auriculæ sub-barbatæ)*, and a blackish stripe running down the tail. The ears of our animal can scarcely be termed ciliated; but two very young specimens from Asám have the basal third of the tail black posteriorly (except at the extreme base), passing more or less upward as a medial line; and it is probable that some adults exhibit the line as described.

It would seem further that the rufous of the muzzle extends sometimes more or less over the crown; and that the tail-end is occasionally blackish, though we have never seen it so *(var. b.* from Butan, of Gray's British Museum Catalogue.

If Nos. 2, 3, and 4, are to be regarded as merely local varieties of the same species, No. 5 should also be so classed: but the difficulty begins with No. 6; and if that be admitted, why not also Nos. 7, 8, and even 9? Wherever drawn, the

ORIOLUS TENUIROSTRIS, nobis, *J. A. S.* XV, 48. A fine adult specimen. We formerly described this species from the skin of a young bird, not in good plumage, which we found among a lot of skins put away as duplicates; and there can be little doubt now that the specimen referred to

line will be quite arbitrary; and, by the same rule, SC. PALMARUM and SC. TRISTRIATUS of India should be placed as varieties of one species, although their voice is singularly different, and the latter race keeps everywhere to the jungle, instead of coming much into gardens and about houses like the other).

5. SC. KERAUDRENII, Is. Geoffroy. Entirely of a deep rufo-ferruginous colour, with blackish paws, and whitish tail-tip: the tail, indeed, only differing from that of No. 4 is not being grizzled at base. Common in the hilly parts of Arakan and Pegu.

6. SC. HYPERYTHRUS, nobis, *n. s.*: *Sc. erythræus*, var. A (?). Gray's *Br. Mus. Catal.* A little smaller than the four preceding races: the upper-parts uniformly grizzled throughout, black and golden-fulvous, but a strong ferruginous tinge on the head, and the ears bright rufous: lower-parts deep rufo-ferruginous, fading on the throat: tail coloured like the back, but its terminal half more brightly tinged with ferruginous and distinctly annulated: paws nigrescent. Length 8 or 9 in.; of tail with hair somewhat less; and foot $1\frac{7}{8}$ in. From Tenasserim (Moulmein?). Presented by Capt. Berdmore.

7. SC. GRISEOPECTUS, nobis, *J. A. S.* XVI, 873. Size of last. The general colour paler, uniformly grizzled throughout on the upper-parts and tail, which has a slight black tip: throat and breast also grizzled, and faintly washed with ferruginous; the belly and inside of limbs much deeper ferruginous: paws not darker than the rest, and no rufous about the face; but a pale ferruginous tinge on the tail. Habitat unknown. Described from a caged animal, in fine condition, which was transferred to the museum at its death.

8. SC. CONCOLOR, nobis, *n. s.* (referred doubtfully to SC. MODESTUS, S. Müller, in *J. A. S.* XX, 166). Size of the two preceding, and much like the non-rufous specimens of SC. CHRYSONOTUS; or like SC. NIGROVITTATUS, but larger and without the lateral stripes and rufous tinge about the head. Lower-parts dull ash-colour: the rest grizzled throughout with black and dull ruddy-ferruginous; the latter somewhat brighter on the middle of the back, croup, and upon the tail, which last is conspicuously ringed with black and dull ferruginous, and has a black tip mingled with hoary-white. From the vicinity of Malacca.

9. SC. CHRYSONOTUS, nobis, *J. A. S.* XVI, 873. Size of the three preceding; and colour variable, but with always a conspicuous black tail-tip. Fur grizzled ash-grey on the limbs and under-parts, and more or less tinged with bright ferruginous on the upper-parts, especially on the nape and fore-part of the back; but in some specimens there is scarcely an obscure wash of this ferruginous, while in others the whole nape, shoulders, and anterior two-thirds of back, are intense

was from Arakan. Its distinctness as a species was obvious; and we now describe a fine adult from Pegu. From the other black-naped Orioles, it is at once distinguished by its much more slender and more distinctly curved bill, of a reddish colour; and by its narrower black nape-band,

bright ferruginous, shading off more or less to grey on the back and haunches: tail grizzled, sometimes a little tinged with ferruginous, and more distinctly annulated towards its black tip. Common in the Tenasserim valley.

(Qu. Does this animal vary in colour according to season, or become more deeply tinged with ferruginous as it advances in age? Our specimen least so tinged is from Mergui; and exhibits merely a faint wash of ferruginous, and this chiefly on the sides of the neck and body.)

The next three species are very closely affined, and not always easy to descriminate. They are much smaller than the preceding.

10. Sc. PYGERYTHRUS, Is. Geoff. Grizzled above as in non-rufous specimens of Sc. CHRYSONOTUS; below weak ferruginous, more or less deep, in some tolerably bright, in others faint and passing to whitish on the throat and sides of face: tail coloured like the back, and more or less distinctly annulated above, with a black extreme tip; below, the rufous of the lower-parts extends more or less up its base, but seldom conspicuously. Length about 7 in.; and tail with hair somewhat more: hind-foot $1\frac{3}{4}$ in.; fringed internally and all the toes tufted with rufous hairs. From the valley of the Irawadi (Rangoon, Pegu, &c.)

11. Sc. ASSAMENSIS, McClelland, Gray: *Sc. Blythii*, Tytler *(Ann. Mag. N. H.*, Sept. 1854, p. 72). Differs from the last in being more fulvescent above, and much less so underneath: tail-tip generally blackish; and commonly a greater development of pale ferruginous underneath the tail than in Sc. PYGERYTHRUS: above, the tail is very indistinctly annulated, if at all so: hue of the upper-parts more or less fulvescent; of the lower dingy whitish, with commonly a slight fulvescent tinge. A very abundant species, inhabiting the valley of Asám, and found about Dacca; also in Tippera, Chittagong, and Arakan.

12. Sc. LOKROIDES, Hodgson: *Sc. lokriah* apud Gray, *Brit. Mus. Catal.* Upper-parts darker than in the preceding, with never a black tail-tip; and the thighs externally often deeply tinged with rufo-ferruginous, though not a trace of this exists in many specimens. From Nepal and Sikim *(tarai?)*.

13. Sc. LOKRIAH, Hodgson (nec apud Gray, *Brit. Mus. Catal.*): *Sc. subflaviventris*, McClelland. Size about that of the three preceding races, or a trifle larger; and the general hue darker and more ruddy above than in Sc. LOKROIDES, grizzled as usual, and with the under-parts moderately deep ferruginous, sometimes rather weak: tail coloured nearly as the back, but with whitish tips above, more or less developed; beneath, tinged with ferruginous, and exhibiting distinctly a double border on each side, from every hair having a white tip and black subterminal portion. A mountain species, inhabiting Nepal, Sikim, Asám

and consequent greater extent of yellow upon the crown: upper-parts bright yellowish-green (rather than greenish-yellow), becoming more yellowish on the rump and upper tail-coverts: crown, neck (below the black occipital band), and entire under-parts, intense pure yellow: inner webs

with the Kbásya hills, and those of Arakan: but the few specimens we have seen from the Arakan mountains seem to be smaller, and of a weaker ferruginous on the under-parts; perhaps a distinct race, but we have not the requisite data to form an opinion on the subject.

14. Sc. TENUIS, Horsfield. A Malayan species affined to the last, but considerably smaller, with the under-parts having but a very faint wash of ferruginous, while a stronger tinge of this hue appears on the shoulders and outside of the limbs; tail coloured as in Sc. LOKRIAH. but the black and white margins (as seen from behind) are hardly so conspicuous. We suspect that it is confined to a certain elevation in the Malayan peninsula and neighbouring great islands.

15. Sc. MODESTUS, S. Müller: *Sc. affinis*, Raffles, apud Horsfield, *Zool. Res. in Java;* nec *Sc. affinis* (verus), as described by Sir Stamford Raffles, *Lin. Tr.* XIII, 259, which description refers distinctly to the pale variety of Sc. BICOLOR: assigned dubiously by Dr. Cantor as a synonyme of Sc. TENUIS. Apparently very like the last, but larger, with the rufous more developed on the outside of the limbs and along the flanks "Length 9 in., and tail 7 in." (Horsfield). Inhabits the Malayan peninsula, and has been met with on the island of Pulo Penang. We have seen no specimen.

16. Sc. PHAYREI, nobis, *n. s.; Sc pygerythrus*, var., apud nos, *J. A. S.* XVII, 345. A beautiful species, of the size of Sc. VITTATUS, and nearly of the same colouring above, but the fur longer, and the tail much more bushy, with a well-defined black tip. Lower-parts bright ferruginous, inclining to maronne on the belly, and continued broadly along the under or hind surface of the tail to its black tip: inside of limbs ferruginous, continued nearly round the hind-limbs, and upon all the feet; the fore-limbs tinged with dusky externally, above the pale rufous foot; and a broad imperfectly defined blackish band upon the flanks, separating the colours of the back and belly Length 9 or 10 in.; and tail with hair about the same: hind-foot 1⅞ in. From some part of the Tenasserim provinces. Presented by Major Phayre.

17. Sc. VITTATUS, Raffles: *Sc. bivittatus*, Desmarest. This very common Malayan species does not appear to extend northward into the Tenasserim provinces. It is readily distinguished by its two lateral bands, the upper white and lower black, with deep rufous under-parts and tail-tip.

18. S. NIGROVITTATUS, Horsfield: *Sc. griseoventer*, Is. Geoffroy. Differs from the last by having the belly ash-grey, no rufous at tip of tail, but a ferruginous tinge on the sides of the head and neck: its upper lateral band is also fulvous, rather than white. Inhabits the Malayan peninsula, where much less common than Sc. VITTATUS.

of the tertiaries dusky-black: the outer coloured like the back, with a slight yellowish spot at tip, and the secondaries narrowly bordered with yellowish: terminal half or more of the greater coverts of the primaries bright yellow; and a few of the outermost coverts of the secondaries tipped with the same: middle tail-feathers black, the rest successively more broadly tipped with yellow; and the tail conspicuously more even or squared than in the commoner O. INDICUS of the same countries.*

19. Sc. ATRODORSALIS, Gray. Size of the preceding, with generally a much more bushy tail: upper-parts grizzled black and fulvous, with a great black patch upon the back; head rufescent, with white whiskers: lower-parts varying in hue from weak ferruginous to deep maronne-red: a tinge of the same upon the haunches; and hairs of the tail black with broad fulvous tips. In one specimen before us, with deep rufous *ears* and dark maronne-red under-parts, the tail is throughout grizzled like the back, and much less bushy than usual: perhaps a distinct race from those with ferruginous under-parts more or less deep, and an extremely bushy tail. Inhabits the Tenasserim provinces.

20. Sc. CANICEPS, Gray, is thus described. "Pale grey, grizzled: back yellowish: beneath, paler grey: tail long, grey, black-varied, ringed, the hair with three broad black bands." Size——? Inhabits Butan (*Ann. Mag. N. H.* X, 1842, p. 263).

21. Sc. TUPAIOIDES? A very curious species inhabiting the Malayan peninsula, which, by its lengthened snout and aspect generally, quite simulates the genus TUPAIA, Raffles, of the order *Insectivora.* It is doubtless the RHINOSCIURUS TUPAIOIDES, Gray (Appendix to *Brit. Mus. Catal.*, p. 195), from Singapore; but we doubt its being correctly referred to Sc. LATICAUDATUS, Diard (S. Müller, *tab.* XV, *f.* 1, 2, and 3), by Dr. Cantor (in *J. A S.* XV, 251). The latter would rather appear to be a second species of the same peculiar type, of much paler and more rufous hue than the Malacca animal, and differing remarkably in the relative proportion of its molars, as noticed by Dr. Cantor (*loc. cit.*), and which inhabits the western coast of Borneo. In a Malacca specimen in our museum, there is even an indication of the pale shoulder-stripe of the TUPAIÆ!

* We are acquainted now with five species of black-naped Orioles; viz.

1. O. CHINENSIS, L. (*vide J. A. S.* XV, 46). China (and the Philippines?)

2. O. MACROURUS, nobis (*vide loc. cit.*) Nicobar islands only, so far as known at present.

3. O. INDICUS, Brisson, Jerdon (*vide loc. cit.*) Common in the Burmese countries; rare in Lower Bengal: found also in S. India and in China.

4. O. CORONATUS, Swainson: *O. hippocrepis*, Wagler. Differs from O. INDICUS in having a narrower nape-mark, a shorter wing, and by the considerably reduced development of the yellow on the secondaries and tertiaries. Hab. Java, and probably other islands of the great archipelago.

5. O. TENUIROSTRIS, nobis, *ut supra.* Burmese countries.

CHATARRHÆA GULARIS, nobis, *n. s.* A handsome species of this group, and the first which we have seen from the eastern side of the Bay of Bengal: though CH. EARLEI, nobis, extends into Tippera. It is affined to CH. EARLEI, but with a still longer tail, which is more distinctly rayed across. Colour ruddy-brown, passing to olivaceous on the hind-part of the back, each feather having a narrow black mesial streak: frontal feathers narrow, stiffish, pointed, and white with black mesial line; these peculiar feathers continued over but not beyond the eye: lores blackish: chin and throat pure white, extending down the front of the neck: ear-coverts and sides of neck unstreaked ruddy: breast and flanks ruddy-brown, paler on belly, and the lower tail-coverts duller brown: tail dull olive-brown, and conspicuously rayed across. Bill dull plumbeous, yellowish towards gape; and legs pale brown, darker on joints. Length about 11 in.; of tail 6 in: closed wing $3\frac{3}{8}$ in.; bill to gape 1 in.; and tarse $1\frac{1}{8}$ in. Pegu.*

ARACHNOTHERA AURATA, nobis, *n. s.* Like A. MAGNA, (Hodgson), but considerably smaller, with the mesial dark streaks to the feathers much less developed, excepting on the crown, and becoming almost obsolete on the rump: on the lower-parts, they are scarcely broader than the shafts of the feathers, whereas in A. MAGNA they are much broader: the edge of the wing is also of a much brighter yellow than in A. MAGNA. Length

* Having had occasion to re-examine the series of Indian CRATEROPODINÆ, it was found expedient to subdivide the genus MALACOCERCUS, Swainson, as follows:

1. ACANTHOPTILA, nobis. Type, *Timalia nipalensis*, Hodgson.

2. CHATARRHÆA, nobis. CH. GULARIS, *ut supra*, is about the most typical species. Others exist in CH. CAUDATA (*Timalia chatarrhæa*, Franklin),—*Ch. Huttoni*, nobis, *J. A. S.* XVI, 476, from Kandahar,—and CH. EARLEI, nobis.

3. MALCOLMIA, nobis. Type, M. ALBIFRONS (v. *Garrulus albifrons*, Gray, Hardw. *Ill. Ind. Zool.*, v. *Timalia Malcolmi*, Sykes). A second species would seem to exist in the *Malurus squamiceps*, Rüppell, of Egypt and Nubia; and a third probably in the *M. acaciæ*, Rüppell, of Arabia Petræa.

4. LAYARDIA, nobis. Type, L. SUBRUFA (v. *Timalia subrufa*, Jerdon, v. *T. pœcilorhyncha*, Lafresnaye). A second species would seem to exist in the *Crateropus rubiginosus*, Rüppell, of Schoa.

5. MALACOCERCUS, Swainson; as confined to the species with rounded frontal plumes and less elongated and graduated tail, which are affined to the true CRATEROPODES of Africa (as exemplified by the *Ixos plebeius*, *leucocephalus*, and *leucopygius* of Rüppell; the *Crateropus Jardinii*, A. Smith, of S. Africa, illustrating another division of the same group). Of restricted MALOCOCERCUS, about ten species (or distinguishable races) exist in all India and Ceylon, to which range of country they appear to be confined exclusively.

of wing 3 in. (instead of $3\frac{1}{2}$ in or more), and the rest in proportion. From Pegu.

PYCNONOTUS HÆMORRHOUS, (Gm.) Specimen rather large, with closed wing $3\frac{3}{4}$ in.; but otherwise resembling examples from Arakan, S. India and Ceylon, Orissa, Agra, &c.; one from Wuzirabád being even larger, with wing $3\frac{7}{8}$ in.; the ordinary length being from $3\frac{3}{8}$ to $3\frac{5}{8}$ in. In P. CAFER, (L.), of Bengal, Nepal, Asám, Tippera, Deyra Doon, &c., the length of closed wing of the male is generally 4 in. The latter species has always a black nape; whereas the other has merely a black cap, the nape being coloured like the back, though generally with whiter margins to the feathers. In P. CAFER, also, the black of the lower-parts descends much further over the breast than in P. HÆMORRHOUS. P. NIGROPILEUS, nobis, of the Tenasserim provinces is a third nearly affined race, which differs from P. HÆMORRHOUS in having the black of the lower-parts confined to the chin, or even wanting altogether; and that of the cap well defined and contrasting sharply with the more or less whitish-edged feathers of the nape.

Genus CORVUS, L. Two species of Crow are sent, one being the common black Crow (C. CULMINATUS, Sykes,) of all India, and which we have received from Pinang and Malacca, where it occurs together with another black species, the C. ENCA (?), Horsfield (v. *macrorhynchos*, Wagler); and the other being the *melanoid* variety of our ordinary Indian Crow (C. SPLENDENS, Vieillot), which appears to be the common Crow of the Tenasserim provinces. In the Pegu specimen now received, and another from Mergui (all that we have seen as yet from that range of country), the *melanism* is more pronounced than in Cinghalese specimens, which exhibit a more decidedly ashy tinge on the nape and breast. In the Pegu specimen this is by no means conspicuously observable: yet Major Phayre remarks of it, that—"this is the common Crow of the branches of the Irawádi; but away from the river in the hills there is a Crow of the same size, but not with the same tinge on the neck, being of an uniform black throughout."

A fine specimen of our Indian MACROPTERYX CORONATUS, (Tickell), is the first example of this species which we have seen from the eastern side of the Bay of Bengal. In the Malayan peninsula, it is replaced by M. KLECHO, (Horsfield), and also (it would appear) by the very beautiful M. CORONATUS, (Tem.)

Of Pigeons, are sent TRERON VIRIDIFRONS, nobis: TR. MALABARICA, Jerdon;* CARPOPHAGA ŒNEA; and a pair of Turtle-doves, which are just

* A Ceylon species which we consider to be TR. POMPADORA, auct., differs from TR. MALABARICA in being rather smaller, with bright yellowish-green forehead,

intermediate to T. SURATENSIS of India and T. TIGRINUS of the Malay countries, or which at least is the race inhabiting the Malayan peninsula. In the *Comptes Rendus*, tom. XI, 17 (January, 1855, No. 2), the Prince of Canino states that the Chinese T. SINENSIS extends its range to the Philippines and all Malasia; but we have never seen it from the Malayan peninsula, where a distinct race abounds, resembling T. SURATENSIS except in wanting the pale vinaceous spots on the scapularies and wings, while retaining the black mesial streaks which are wanting in T. CHINENSIS: there is also much less ash-colour on the wings than in T. SURATENSIS: but it is of the same size as the latter, or much smaller than T. CHINENSIS (which last has also deep ash-coloured lower tail-coverts). Of the two Peguan specimens now sent by Major Phayre, one differs little from the Malayan peninsula Dove, except that the spotting begins to appear upon the wings; while in the other the spots spread over the back, but are of a dull rusty colour and less defined than in the common Indian race. The Prince of Canino remarks, that T. SURATENSIS is particularly abundant in Ceylon: but it can scarcely be anywhere more so than in Lower Bengal.

FRANCOLINUS PHAYREI, nobis (*J. A. S.* XII, 1011), et FR. SINENSIS, (*Tetrao sinensis*, Osbeck; *T. pintadeus*, Scopoli: *T. perlatus* et *T. madagascariensis*, Gmelin, nec Scopoli). We have compared the 'Pintado Partridge' of the Mauritius with a Chinese specimen, and can detect not the slightest difference; wherefore it may be inferred that the species was probably introduced into the Mauritius direct from China.* We now hesitate to consider FR. PHAYREI as distinct from FR. SINENSIS: the difference between them being even less than between CACCABIS GRÆCA (v. *saxatilis*) and C. CHUKAR! As compared with FR. SINENSIS, the Peguan bird would seem to have the long black supercilium broader, and extending more across the forehead, and the rufous supercilium above it narrower, and paler; also to have more developed spurs, and a somewhat

the throat yellower, and breast unsullied green (or having no ruddy patch): lower tail-coverts also white mixed with green, in both sexes; as in the female (not the male) of TR. MALABARICA. Closed wing of male 5½ in.; in the other 5¾ to 6 in.

* The Stag of the Mauritius seems, in like manner, to be the C. RUSA apud S. Müller, of Java, but with antlers certainty more flexuous in the beam. The Mauritian Hare is LEPUS NIGRICOLLIS of S. India and Ceylon, v. *L. melanauchen*, Tem., of Java, where also it has probably been introduced. The GALLOPERDIX SPADICEUS of S. India (a thorough Indian type) is common in the Mauritius, and (it is said) also in Madagascar, which latter surely requires confirmation! A common Malayan Monkey (MACACUS CYNOMOLGOS) is said to have gone wild on the island; and perhaps one or two of the small Passerine birds may have been introduced, as ESTRELDA ASTRILD from S. Africa, and certainly ACRIDOTHERES TRISTIS from India (the latter for the purpose of keeping down the locusts).

smaller bill. In Fr. Phayrei the spurs seem generally to be $\frac{3}{8}$ in. length: and it remains to ascertain if they ever exceed $\frac{1}{8}$ in. in the species inhabiting China and the Mauritius. In plumage we can detect no further difference than has been mentioned; and have never seen females of either.

The rest of Major Phayre's Peguan birds are as follow:—Palæornis torquatus, P. schisticeps (!), P. cyanocephalus, Buceros albirostris, Halcyon gurial, Alcedo bengalensis, Coracias affinis, Eurystomus orientalis, Megalaima lineata, Chrysocolaptes sultaneus, Tiga intermedia, Phœnicophaus tristis, Harpactes erythrocephalus, Dendrocitta rufa, Gracula intermedia, Garrulax Belangeri, Parus flavocristatus, Passer flaveolus, Emberiza aureola, Pipastes agilis, Prinia rufescens, Pomatorhinus leucogaster, Tephrodornis ponticeriana, Petrocossyphus pandoo, Copsychus saularis (*nec* mindanensis), Cercotrichas macrourus, Cyornis rubeculoides, Erythrosterna leucura, Pratincola caprata, Pericrocotus speciosus, Chaptia œnea, Edolius paradiseus (var. grandis, Gould), Dicrurus longicaudatus, Myiagra azurea, Pycnonotus melanocephalus, Iole virescens, Phyllornis cochinchinensis, Irena puella, Oriolus melanocephalus, Turnix ocellatus, Hoplopterus ventralis, and Butorides javanicus.

Also, of Reptilia, a small Box terrapin, which heretofore has only been satisfactorily known to inhabit Java. It is the Cistudo dentata, (Gray), *C. Diardii* of Dumeril and Bibron, *Emys Hasseltii*, Boie, and *Cyclemys orbicularis*, Bell: remarkable among the Cistudines for its flattened form and notched hind-margin of sternum.*

E. Blyth.

* Capt. Berdmore has since sent a living specimen, from Schwe Gyen on the Sitang river, Pegu: colour of naked parts olive-grey, with longitudinal dull orange streaks on the neck, and a broader sincipital streak of the same. It is unusually quick in its movements, for a Tortoise! He has also sent the curious lizard-tailed and large-headed Terrapin (Platysternon megacephalum, Gray), heretofore only known from China; and several living specimens of Emys ocellata, Dumeril and Bibron; and the very young of Emyda punctata, Gray, (*Cryptopus granosus*, D. and B). Emys ocellata would appear to be the commonest species in the Burmese rivers; and its naked parts are olive-grey, the crown blackish, with a yellowish-white v-like mark over the snout, continued as a supercilium over each eye and back upon the neck; another similar line behind the eye, and both are often more or less broken into spots. Carapax dusky, mottled with yellowish; a great black spot surrounded with a pale *areola* upon each discoidal plate; dorsal ridges blackish with pale border: and lower-parts wholly yellowish-white. Some are brighter-coloured than others; and the *ocelli* become proportionally smaller as they increase in size. The carapax of our largest specimen measures 9 by $6\frac{1}{4}$ in.; but it probably is not nearly full grown.

Presented.

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Meteorological Observations kept at the Residency, Lucknow. N. Lat. 26-51-18. Long. 81, for the Month of November, 1854.

Date.	At 6 a. m. Thermometer Wet Bulb.	At 6 a. m. Thermometer Dry Bulb.	At 6 a. m. Barometer.	At 6 a. m. Force and direction of Wind.	At 6 a. m. Aspect of Sky.	At 9 a. m. Thermometer. Wet Bulb.	At 9 a. m. Thermometer. Dry Bulb.	At 9 a. m. Barometer.	At 9 a. m. Force and direction of Wind.	At 9 a. m. Aspect of Sky.	Noon. Thermometer Wet Bulb.	Noon. Thermometer Dry Bulb.	Noon. Barometer.	Noon. Force and direction of Wind.	Noon. Aspect of Sky.
1	67	70	29.98	S. E. lt.	Strati, rain.	68	70	30.	E. lt.	Strati.	..	..	..	..	....
2	..	..	..	....	....	..	..	..	..	....	70	73	29.96	W. lt.	Cumulo-strati.
3	..	..	..	....	....	..	..	..	..	....	71	74	30.06	Ditto.	Strati.
4	69	71	30.	W. lt.	Cumulo-strati.	69	71	.14	N. W. lt.	Strati.	71	75	30.	N. W. lt.	Cumuli.
5	..	..	..	....	....	..	..	..	..	....	71	79	29.98	Ditto.	Cirri.
6	70	72	29.94	W. lt.	Cirri.	70	73	.02	W. lt.	Strati.	..	..	..	..	....
7	65	68	.96	Ditto.	Clear.	65	71	.02	S. W. lt.	Clear.	64	76	30.02	W. lt.	Clear.
8	62	67	30.02	S. lt.	Ditto.	..	..	..	..	....	63	75	.09	S. lt.	Ditto.
9	..	..	..	....	....	59	67	.12	W. lt.	Clear.	..	..	..	..	....
10	55	62	.12	W. lt.	Clear.	59	69	.25	Ditto.	Ditto.	59	73	.22	S. N. lt.	Clear.
11	..	..	..	....	....	..	..	..	..	....	61	70	.20	S. E. lt.	Cirri.
12	56	64	.8	E. lt.	Clear.	58	65	.15	S. E. lt.	Clear.	..	..	..	..	....
13	58	62	.04	S. E. lt.	Cirri.	..	..	..	..	....	..	..	..	..	....
14	..	..	..	....	....	...	..	..	..	....	..	..	..	..	....
15	..	..	..	....	....	63	66	.08	S. lt.	Clear.	63	74	30.	S. lt.	Cirri.
16	60	64	.04	S. E. lt.	Clear.	63	71	.18	Ditto.	Ditto.	62	74	18	Ditto.	Ditto.
17	..	..	..	....	....	58	70	.15	S. W. lt.	Ditto.	..	..	..	..	....
18	53	60	29.98	W. lt.	Clear.	..	..	..	..	....	..	..	..	..	....
19	..	..	..	....	....	..	..	..	..	....	..	..	..	..	....
20	53	59	30.02	W. lt.	Clear.	..	..	..	..	....	60	69	.12	W. lt.	Clear.
21	53	57	.06	Ditto.	Ditto.	..	..	..	..	....	59	69	.18	N. lt.	Ditto.
22	52	56	.08	....	Ditto.	..	..	..	..	....	..	69	.18	E. lt.	Ditto.
23	53	58	.04	W. lt.	Ditto.	..	..	..	..	....	..	..	..	..	....
24	57	60	.10	Ditto.	Ditto.	..	..	..	..	....	61	70	.18	S. lt.	Clear.
25	56	58	.08	S. lt.	Ditto.	59	65	.24	S. W. lt.	Clear.	..	..	..	..	....
26	56	59	.12	S. W. lt.	Ditto.	57	63	.20	W. lt.	Ditto.	61	70	.18	W. lt.	Clear.
27	58	60	.08	W. lt.	Cirri.	60	65	.18	N. W. lt.	Cirri.	62	71	.14	N. W. lt.	Cloudy.
28	58	62	.05	S. lt.	Cloudy.	..	..	..	..	....	60	70	.08	Ditto.	....
29	56	58	.04	Ditto.	Clear.	..	..	..	..	....	..	..	..	..	....
30	55	58	.08	N. W. lt.	Cirri.	..	..	..	..	....	60	69	.18	S. E. lt.	Clear.
Total.	1222	1305	.91	....	....	808	886	.173	..	....	1078	1300	.195	..	....
Averg.	58.190	62.143	30.433	....	....	62.154	68.154	30.133	..	....	63.412	72.222	30.108	..	....

Meteorological Observations kept at the Residency, Lucknow. N. Lat. 26-51-18, *Long.* 81, *for the Month of November*, 1854.

At 3 P. M.					At 6 P. M.						
Thermometer.		Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Barometer.	Force and direction of Wind.	Aspect of Sky.	Rain Guage Inches	Remarks.
Wet Bulb.	Dry Bulb.				Wet Bulb.	Dry Bulb.					
..	..	..	..	....	..	..	..	....	....	1.5	
70	73	29.92	W. lt.	Cumulo-strati.	..	..	..	....	....	.1	Light rain.
..	..	..	..	....	..	..	..	....	....		
71	76	.96	N. W. lt.	Cumuli.	71	75	29.95	N. W. lt.	Cumuli.	.5	
..	..	..	..	....	..	..	..	....	....		
68	76	.94	W. lt.	Cumuli.	69	74	.92	W. lt.	Clear.		
64	76	30.02	Ditto.	Clear.	64	75	30.	Ditto.	Ditto.		
63	76	.04	S. lt.	Ditto.	66	77	.04	Ditto.	Ditto.		
62	74	.02	W. lt.	Ditto.	64	72	.1	Ditto.	Ditto.		
59	73	.20	Ditto.	Ditto.	62	70	.18	Ditto.	Ditto.		
61	73	.16	S. E. lt.	Ditto.	..	..	..	....	....		
..	..	..	..	....	64	71	.14	Lt.	Cirri.		
..	74	.10	S. E. lt.	Clear.	..	..	..	....	....		
61	74	.08	Ditto.	Ditto.	..	..	..	....	....		
..	..	.12	..	....	..	..	..	....	....		
63	75	.10	S. W. lt.	Clear.	..	..	..	....	....		
..	..	..	..	....	..	..	..	....	....		
..	..	..	..	....	..	..	..	....	....		
58	72	.08	W. lt.	Clear.	..	..	..	....	....		
57	72	.08	Ditto.	Ditto.	..	..	..	....	....		
..	..	..	..	....	..	..	..	....	....		
61	70	.10	W. lt.	Clear.	..	..	..	....	....		
..	..	..	..	....	..	..	..	....	....		
61	70	.12	S. lt.	Clear.	61	68	.12	S. lt.	Clear.		
60	70	.20	S. W. lt.	Ditto.	61	67	.20	Ditto.	Ditto.		
..	..	..	..	....	..	..	..	....	....		
62	71	.12	N. W. lt.	Cloudy.	..	..	..	....	....		
..	..	..	..	....	60	69	.08	W. lt.	Cloudy.		
..	..	..	..	....	60	68	.12	S. E. lt.	Cirri.		
..	..	..	..	....	..	..	..	....	....		
1001	1245	146	..	....	702	786	.76	....	....	1.11	.....

Abstract of the Meteorological Register for November, 1854.

Lucknow, 1*st December*, 1854.

	Thermometer 6 A. M.			Thermometer 9 A. M.			Thermometer Noon.			Thermometer 3 P. M.			Thermometer 6 P. M.		
	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.
Wet,..	70	52	58.190	70	57	62.154	71	59	63.412	71	57	62.563	71	60	63.818
Dry, .	72	56	62.143	73	63	68.154	79	69	72.222	76	70	73.235	77	67	71.455

Barometer 6 A. M.			Barometer 9 A. M.			Barometer Noon.			Barometer 3 P. M.			Barometer. 6 P. M.		
Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.
30.80	29.94	30.433	32.25	30.02	30.133	30.22	29.96	30 108	30.29	29.92	30.811	30.20	29 92	30.691

Remarks.

The prevailing winds this month, W. & S. W. moderate.

The weather generally speaking clear and pleasant.

There have been a light shower of rain for 3 days 1, 2, and 4 to the extent of 2, 1.

Mean Temperature of the month.

Wet Bulb, ... 62.027.

Dry, ... 69.442.

J. FAYRER, M. D., F. R. C. S.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1855.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the cistern of the Standard Barometer above the level of the Sea, 18.11 feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	°	°	°	°
1	*Sunday.*							
2	29.783	29.872	29.720	0.152	85.1	96.4	75.9	20.5
3	.779	.860	.719	.141	84.6	95.2	76.4	18.8
4	.802	.885	.742	.143	85.4	94.6	79.6	15.0
5	.794	.876	.720	.156	83.4	93.8	75.8	18.0
6	*Good-friday.*							
7	.781	.838	.725	.113	85.4	97.7	77.5	20.2
8	*Sunday.*							
9	.841	.920	.760	.160	86.1	96.8	79.6	17.2
10	.815	.886	.761	.125	84.6	93.4	77.8	15.6
11	.822	.892	.770	.122	84.6	93.2	78.4	14.8
12	.852	.935	.787	.148	85.2	93.8	78.4	15.4
13	.805	.901	.734	.167	83.5	93.0	77.4	15.6
14	.771	.850	.676	.174	84.3	95.2	76.0	19.2
15	*Sunday.*							
16	.801	.896	.712	.184	85.4	95.0	78.2	16.8
17	.773	.867	.672	.195	81.5	90.6	73.6	17.0
18	.727	.809	.670	.139	81.8	90.4	75.8	14.6
19	.728	.784	.674	.110	81.2	89.2	76.6	12.6
20	.721	.794	.620	.174	76.9	83.4	72.8	10.6
21	.725	.789	.630	.159	77.4	85.8	72.0	13.8
22	*Sunday.*							
23	.724	.798	.654	.144	70.7	76.6	66.0	10.6
24	.765	.845	.682	.163	74.9	84.8	67.6	17.2
25	.721	.788	.641	.147	79.5	87.6	71.2	16.4
26	.662	.720	.584	.136	81.5	90.2	75.0	15.2
27	.709	.789	.637	.152	81.5	91.2	74.0	17.2
28	.722	.795	.669	.126	84.7	92.8	79.8	13.0
29	*Sunday.*							
30	.711	.799	.640	.159	87.5	96.8	80.9	15.9

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1855.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon. *(Continued.)*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of Air.	Additional weight of vapour required for complete saturation.	Mean degree of Humidity complete saturation being unity.
	°	°	°	°	Inches.	T. gr.	T. gr.	
1	*Sunday*							
2	76.5	8·6	72.2	12.9	0.781	8.33	4.24	0.663
3	76.5	8.1	72.4	12.2	.785	.39	.00	.677
4	76.1	9.3	71.4	14.0	.761	.12	.56	.640
5	77.6	5.8	74.7	8.7	.846	9.06	2.90	.758
6	*Good-friday.*							
7	78.9	6.5	75.6	9.8	.871	.29	3.39	.733
8	*Sunday.*							
9	78 9	7.2	75.3	10.8	.862	.19	.76	.710
10	78.9	5.7	76.0	8 6	.882	.43	2.96	.761
11	79.6	5.0	77.1	7.5	.913	.76	.63	.788
12	80.2	5 0	77.7	7.5	.931	.94	.67	.788
13	77.0	6 5	73.7	9.8	.819	8.78	3.22	.732
14	77.3	7.0	73.8	10.5	.822	.78	.50	.715
15	*Sunday.*							
16	78.5	6.9	75.0	10.4	.854	9.12	.56	.719
17	75 7	5.8	72.8	8.7	.795	8.55	2.76	.756
18	77.1	4.7	74.7	7.1	.846	9.10	.30	.798
19	77 2	4.0	75.2	6.0	.860	.26	1.95	.826
20	74.2	2 7	72 8	4.1	.795	8.64	.22	.876
21	74.4	3.0	72.9	4.5	.797	.64	.37	.863
22	*Sunday.*							
23	69.0	1.7	68.1	2.6	.684	7.50	0.68	.917
24	71.6	3.3	69.9	5.0	.725	.90	1.38	.851
25	75.3	4.2	73.2	6.3	.806	8.71	.95	.817
26	78 4	3.1	76.8	4.7	.905	9.73	.58	.860
27	78.1	3.4	76.4	5.1	.893	.62	.69	.851
28	80.1	4.6	77.8	6.9	.934	.99	2.43	.804
29	*Sunday.*							
30	82.3	5.2	79.7	7.8	.992	10.55	.94	.782

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1855.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon. *(Continued.)*

Hour.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer for each hour during the Month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the Month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	°	°	°	°
Mid-night.	29.775	29.903	29.698	0.205	78.4	82.2	69.6	12.6
1	.765	.859	.686	.173	78.1	82.2	69.1	13.1
2	.744	.829	.660	.169	77.5	81.9	68.1	13.8
3	.735	.830	.646	.184	77.3	81.6	68.0	13.6
4	.730	.835	.630	.205	76.8	81.0	67.6	13.4
5	.751	.846	.663	.183	76.7	80.9	67.6	13.3
6	.771	.865	.686	.179	76.4	81.0	68.0	13.0
7	.793	.889	.697	.192	77.0	81.8	67.8	14.0
8	.814	.912	.711	.201	79.3	84.4	68.3	16.1
9	.832	.935	.720	.215	81.6	87.2	66.0	21.2
10	.837	.935	.704	.231	83.9	89.2	66.9	22.3
11	.826	.923	.690	.233	86.4	92.2	71.1	21.1
Noon.	.801	.899	.665	.234	88.5	94.6	73.4	21.2
1	.773	.873	.624	.249	89.3	95.6	68.4	27.2
2	.748	.843	.610	.233	90.4	96.8	70.2	26.6
3	.720	.813	.595	.218	90.8	97.7	70.4	27.3
4	.708	.794	.584	.210	90.2	96.5	69.6	26.9
5	.697	.787	.593	.194	88.5	95.1	68.8	26.3
6	.708	.798	.611	.187	85.6	92.6	68.8	23.8
7	.728	.808	.633	.175	83.1	89.8	69.0	20.8
8	.743	.829	.651	.178	81.6	87.2	68.6	18.6
9	.770	.855	.681	.174	80.3	85.0	69.5	15.5
10	.779	.851	.693	.158	79.5	83.4	70.0	13.4
11	.779	.847	.693	.154	78.9	82.4	69.7	12.7

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1855.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon. *(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of Air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
Midnight.	75.9	2.5	74.6	3.8	0.843	9.13	1.18	0.886
1	75.7	2.4	74.5	3.6	.840	.11	.11	.891
2	75.3	2.2	74.2	3.3	.832	.04	.00	.900
3	75.4	1.9	74.4	2.9	.838	.10	0 88	.912
4	75.0	1.8	74.1	2.7	.830	.02	.81	.918
5	74.8	1.9	73.8	2 9	.822	8.93	.87	.911
6	74.7	1.7	73.8	2.6	.822	.93	.79	.919
7	75.3	1.7	74.4	2.6	.838	9.10	.79	.920
8	76.7	2.6	75.4	3.9	.865	.35	1.24	.883
9	77.4	4.2	75.3	6.3	.862	.29	2.05	.819
10	78.0	5.9	75.0	8.9	.854	.14	.99	.754
11	78.9	7.5	75.1	11.3	.857	.13	3.93	.699
Noon.	79.3	9.2	74.7	13.8	.846	8.97	4.91	.646
1	79.1	10 2	74.0	15.3	.827	.77	5.44	.617
2	79.4	11.0	73.9	16.5	.824	.70	.97	.593
3	79.4	11.4	73.7	17.1	.819	.66	6.18	.584
4	79.3	10.9	73.8	16.4	.822	.69	5.90	.596
5	78.6	9.9	73.6	14.9	.817	.66	.22	.624
6	78.2	7.4	74.5	11.1	.840	.98	3.78	.704
7	77.2	5.9	74.2	8.9	.832	.93	2.93	.753
8	76.8	4.8	74.4	7.2	.838	9.02	.32	.795
9	76.5	3.8	74.6	5.7	.843	.09	1.82	.833
10	76.3	3.2	74.7	4.8	.846	.14	.52	.857
11	76.1	2.8	74.7	4.2	.846	.16	.31	.875

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1855.

Solar radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain.	Prevailing direction of the Wind.	General Aspect of the Sky.
	o	Inches.		
1	*Sunday.*	0.14	....	
2	145.0		S. or S. W.	Cloudless till 10 A. M. scattered _i or ⌒i or \i till 8 P. M. cloudless afterwards.
3	151.9		W. or S.	Cloudless till 7 A. M. scattered _i till 1 P. M. cloudless afterwards.
4	151.7		S. or N. E.	Cloudless.
5	144.2		S. or S. E.	Cloudless till 8 A. M. scattered \i and _i till 7 P. M. cloudless afterwards.
6	*Good-friday.*		....	
7	135.7		S. or S. W.	Cloudless till 5 A. M. scattered ⌒i or _i till 5 P. M. cloudless afterwards.
8	*Sunday.*		....	
9	153.5		S. S. E. or S. or S.W.	More or less cloudy till 4 P. M. cloudless afterwards.
10	139.0		S. or S. E.	Cloudless.
11	133.4		S. E. or S.	Cloudless till 7 A. M. various clouds till 7 P. M. cloudless afterwards.
12	140.0		S.	Cloudless till 5 A. M. more or less cloudy afterwards.
13	129.4		S. or N. E. or S. E.	Cloudy till 6 P. M. cloudless afterwards.
14	143.0		Calm or S. E.	Cloudless till 4 A. M. various clouds till 8 P. M. cloudless afterwards.
15	*Sunday.*		....	
16	133.6		S. or N. E.	Cloudless till 5 A. M. scattered _i till 5 P. M. cloudless afterwards.
17	133.8	0.14	N. E. or S. E.	More or less cloudy the whole day.
18	133.0		S. E. or N. W. or S.	Cloudless till 4 A. M. more or less cloudy afterwards, also drizzling at 8 P. M.
19	..		S. or S. W.	Cloudy nearly the whole day. Also drizzling from 2 P. M. to 4 P. M.
20	120.0	0.65	S. or S. E.	Cloudy and constantly drizzling.
21	..	0.36	S. or S. E.	Cloudy, also raining from 4 P. M. to 8 P. M.
22	*Sunday.*	2.20	....	
23	..		E. or S. E. or S. W. [or S. S. W.	Scattered _i till 6 A. M. cloudy afterwards, also drizzling between 9 and 10 A. M.
24	125.0		S. W. or N. W. or S. E.	Various clouds the whole day.
25	128.2		S. E. or S.	Cloudless till 7 A. M. scattered ⌒i or _i afterwards.
26	..	0.34	S. or E. or S. W.	Cloudy till 7 P. M. cloudless afterwards.
27	136.0		S.E. or N.E. or W.or N.	More or less cloudy till 6 P. M. cloudless afterwards.
28	135.5		E. or N. E.	Cloudless till 2 A. M. cloudy till 6 P. M. cloudless afterwards.
29	*Sunday.*		....	
30	134.0		S. E. or S.	Cloudy till 10 A. M. cloudless afterwards.

\i Cirri, _i Cirro-strati, ⌒i Cumuli, ⌒i Cumulo-strati, _i Nimbi. _i Strati.

Meteorological Observations kept at the Residency, Lucknow. Lat. 26-51-18, *Long.* 81, *for the Month of October*, 1854.

Date.	At 6 a. m. Thermometer. Wet Bulb.	At 6 a. m. Thermometer. Dry Bulb.	At 6 a. m. Barometer.	At 6 a. m. Force and direction of Wind.	At 6 a. m. Aspect of Sky.	At 9 a. m. Thermometer. Wet Bulb.	At 9 a. m. Thermometer. Dry Bulb.	At 9 a. m. Barometer.	At 9 a. m. Force and direction of Wind.	At 9 a. m. Aspect of Sky.	Noon. Thermometer. Wet Bulb.	Noon. Thermometer. Dry Bulb.	Noon. Barometer.	Noon. Force and direction of Wind.	Noon. Aspect of Sky.
1	77	79	29.78	Calm.	Cirro-cumuli.	77	83	29.86	S. E. lt.	Clear.	77	85	.82	S. E. lt.	Clear.
2	76	78	.80	Ditto.	Clear.	..	..	..	..	....	76	85	.92	Ditto.	Ditto.
3	..	..	..	..	....	77	85	.95	S. E. lt.	Clear.	..	..	..	..	....
4	75	77	.85	S. E. lt.	Clear.	..	..	..	..	....	75	86	.92	S. E. lt.	Cumuli.
5	77	81	.90	Ditto.	Ditto.	78	84	.96	S. lt.	Clear.	..	..	..	..	....
6	78	80	.88	Ditto.	Cirri.	79	85	.96	S. E lt.	Cirri	80	86	.92	E. lt.	Cumuli.
7	77	79	.82	Ditto.	Cirro-cumuli.	77	80	.90	Ditto.	Rain.	80	84	.87	S. E. lt.	Cumulo-strati.
8	78	77	.82	..	Cumulo-strati.	77	80	.88	N. W. lt.	Cumuli.	..	..	..	..	....
9	77	80	.92	E. lt.	Clear.	82	83	.96	S. E. lt.	Clear.	80	86	.96	S. E. lt.	Cumuli.
10	..	..	..	..	....	..	..	..	..	....	..	..	..	..	....
11	78	80	.94	S. E. lt.	Cirri.	..	..	.79	..	....	79	87	.92	S. E. lt.	Cumuli.
12	76	80	.88	Ditto.	Clear.	..	..	..	..	....	..	..	..	..	....
13	73	77	.90	S W. lt.	Ditto.	..	..	..	..	....	..	..	..	..	....
14	73	75	.94	W. lt.	Ditto.	75	82	30.05	W. lt.	Clear.	73	85	30.04	W. lt.	Clear.
15	70	75	.98	Ditto.	Ditto.	..	..	..	..	....	71	84	.06	Ditto.	Ditto.
16	65	72	.94	Ditto.	Ditto.	65	77	30.02	W. lt.	Clear.	66	81	.02	Ditto.	Ditto.
17	63	69	.92	Ditto.	Ditto.	66	75	29.98	Ditto.	Ditto.	..	..	..	..	....
18	63	70	.92	Ditto.	Ditto.	66	75	30.	Ditto.	Ditto.	65	81	30.	W. lt.	Clear.
19	65	69	.86	Ditto.	Ditto.	68	77	.02	N. W. lt.	Ditto.	..	..	..	..	....
20	66	69	.92	Ditto.	Ditto.	67	78	.05	E. lt.	Ditto.	..	..	..	..	....
21	..	..	..	..	....	..	..	..	..	....	..	..	..	..	....
22	70	73	.98	S. E. lt.	Cumuli.	..	..	..	..	....	..	..	..	..	....
23	70	75	.98	Ditto.	Ditto.	..	..	..	..	....	72	83	30.04	S. E. lt.	Cumuli.
24	..	..	..	..	....	..	..	..	..	....	..	..	..	..	....
25	69	74	30.	S. E. lt.	Clear.	70	79	30.08	S. E. lt.	Clear.	68	82	30.08	S. E. lt.	Clear.
26	65	71	.95	Ditto.	Ditto.	65	76	.02	Ditto.	Ditto.	65	81	30.03	Ditto.	Ditto.
27	62	70	.90	W. lt.	Ditto.	62	73	30.	W. lt.	Ditto.	61	80	29.98	W. lt.	Ditto.
28	59	68	.95	..	Ditto.	64	72	30.05	S. W. lt.	Ditto.	65	79	30.08	S. W. lt.	Ditto.
29	61	66	30.	S. W. lt.	Ditto.	..	..	..	..	....	..	..	..	..	.. [strati.
30	64	68	30.	S. E. lt.	Cirro-cumuli.	67	76	30.12	S. E. lt.	Cirro-cumuli.	68	80	30.05	S E. lt.	Cirro-cumuli-
31	70	74	30.05	Ditto.	Cumulo-strati.	71	74	30.10	Ditto.	Strati: rain.	71	73	30.02	E. lt.	Heavy rain.
Total.	1897	2006	2118	..	....	1353	1494	955	..	....	1292	1488	.853	..	....

At 3 P. M.					At 6 P. M.						
Thermometer.		Barometer.	Force and direction of Wind.	Aspect of Sky.	Thermometer.		Barometer.	Force and direction of Wind.	Aspect of Sky.	Rain Guage Inches.	Remarks.
Wet Bulb.	Dry Bulb.				Wet Bulb.	Dry Bulb.					
76	80	.80	S. E. lt.	Clear.	..	..	..	..	....		
..	..	..	..	....	..	..	..	..	....		
76	87	.84	S. E. lt.	Cumuli.	76	85	.84	S. E. lt.	Clear.		
75	87	.85	Ditto.	Ditto.	75	85	.84	Ditto.	Ditto.		
77	87	.92	Ditto.	Ditto.	..	..	..	..	....		
77	81	.82	S. E.	Strati : rain.	..	..	..	..	....		
..	..	..	..	....	76	77	.80	W. lt.	Rain, thunder.	0.5	Shower.
..	..	..	..	....	..	..	..	..	...	1.2	
80	86	.92	S. E. lt.	Cumuli.	80	85	.92	..	Clear.		
..	..	..	..	....	80	86	.96	S. E. lt.	Ditto.		
..	..	..	..	....	..	..	..	..	...		
..	..	..	..	....	76	85	.88	S. W. lt.	Clear.		
73	85	.95	S. W. lt.	Clear.	74	85	.94	W. lt.	Ditto.		
..	..	..	..	....	74	83	30.	Ditto.	Ditto.		
..	..	..	..	....	..	..	..	..	....		
66	82	.98	W. lt.	Clear.	71	80	.98	W. lt.	Clear.		
68	82	.95	Ditto.	Ditto.	..	..	..	..	....		
..	..	..	..	....	68	79	.94	W. lt.	Clear.		
66	82	.95	W. lt.	Clear.	..	..	..	..	....		
67	80	.94	N. W. lt.	Ditto.	..	..	..	..	....		
..	..	..	..	....	72	80	31.02	E. lt.	Clear.		
..	..	..	..	....	..	..	..	..	....		
..	..	..	..	....	72	81	30.	S. E. lt.	Clear.		
..	..	..	..	....	..	..	..	..	....		
69	83	30.	S. E. lt.	Cumuli.	69	81	29.98	S. E. lt.	Clear.		
..	..	..	.	....	..	..	..	..	....		
..	..	..	..	....	64	76	.95	W. lt.	Clear.		
63	79	30.04	S. W. lt.	Clear.	66	77	30.20	S. W. lt.	Ditto.		
65	79	.06	S. lt.	Ditto.	..	..	..	..	....		
69	80	.04	S. E. lt.	Cirro-Cumuli.	..	..	..	..	....		
70	73	29.98	E. F.	Heavy rain.	..	..	..	..	....		
1137	1313	1124	..	....	1093	1225	1057	..	....	1.25	....
71.063	82.063	29.703	..	....	72.867	81.667	29.705	..	....	..	....

Abstract of the Meteorological Register for October, 1854.

Lucknow, 1*st November*, 1854.

	Thermometer 6 A. M.			Thermometer 9 A. M.			Thermometer Noon.			Thermometer 3 P. M.			Thermometer 6 P. M.			Remarks.
	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	
Wet,..	78	59	70.259	82	62	71.210	80 0	61 0	71.777	80.0	63.0	71.063	80.0	64.0	72 867	Prevailing winds this month, W. and S. E. but always Light. The aspect of the Sky for the greater portion of the month clear.
Dry,..	81	66	74.296	85	72	78.632	87 0	73 0	826 66	87.0	73.0	82.063	86.0	76.0	81.667	The weather pretty fair, and pleasant. The rain fell on 3 days only. Total quantity of rain 1.25.
	Barometer 6 A. M.			Barometer 9 A. M.			Barometer Noon.			Barometer 3 P. M.			Barometer 6 P. M.			Mean temperature of the month, Wet Bulb,.... 71.435. Dry,..... 79.865.
	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	Maximum.	Minimum.	Mid.	
	30.05	29.78	29.784	30.10	29.79	29.526	30.08	29.82	29.474	30.06	29.80	29.703	30.02	29.80	29.705	

J. FAYRER, M. D F. R. G. S.

Date.	At 6 A. M. Thermometer. Wet Bulb.	At 6 A. M. Thermometer. Dry Bulb.	At 6 A. M. Barometer.	At 6 A. M. Force and direction of Wind.	At 6 A. M. Aspect of Sky.	At 9 A. M. Thermometer. Wet Bulb.	At 9 A. M. Thermometer. Dry Bulb.	At 9 A. M. Barometer.	At 9 A. M. Force and direction of Wind.	At 9 A. M. Aspect of Sky.	Noon. Thermometer Wet Bulb.	Noon. Thermometer Dry Bulb.	Noon. Barometer.	Noon. Force and direction of Wind.	Noon. Aspect of Sky.
1	57	60	30.12	..	Clear.	..	..	..	..	....	61	69	30.20	..	Clear.
2	62	64	.15	N. E. lt.	Strati-rain.	62	65	30.2	..	Rain.	63	69	.12	N. W. lt.	Cirri.
3	59	62	.06	W. lt.	Clear.	..	..	..	..	....	62	69	.12	W. lt.	Cumuli.
4	58	60	.08	Ditto.	Ditto.	59	62	.14	W. lt.	Clear.	..	..	..	..	....
5	..	..	..	..	....	..	..	..	..	....	..	..	..	..	....
6	57	61	.12	..	Cirri.	59	65	.22	S. E. lt.	Cumuli.	60	68	.18	S. E. lt.	Cumuli.
7	56	59	.06	S. W. lt.	Ditto.	..	..	..	..	....	59	67	.14	W. lt.	Ditto.
8	54	57	.02	S. lt.	Clear.	58	63	.14	S. E. lt.	Clear.	58	67	.12	S. E. lt.	Clear.
9	53	56	.05	S. E.	Ditto.	57	62	.15	Ditto.	Ditto.	59	66	.16	Ditto.	Ditto.
10	57	59	.10	S. E. lt.	Cirri.	57	62	.15	S. lt.	Ditto.	61	69	.15	S. lt.	Ditto.
11	55	59	.11	Ditto.	Clear.	57	62	.25	Ditto.	Ditto.	58	68	.26	..	Ditto.
12	54	59	.20	W. lt.	Ditto.	56	61	.24	W. lt.	Ditto.	..	..	..	..	....
13	55	58	.16	Ditto.	Cirri.	55	60	.24	Ditto.	Cirri.	58	68	.26	W. lt.	Cirri.
14	57	61	.18	Ditto.	Clear.	60	65	.22	Ditto.	Clear.	63	71	.20	Ditto.	Clear.
15	57	60	.06	S. W. lt.	Cirri.	59	65	.16	Ditto.	Cirri.	..	..	..	..	....
16	53	58	.02	W. lt.	Ditto.	..	..	..	..	....	..	..	..	..	....
17	51	56	.05	Ditto.	Ditto.	54	61	.14	W. lt.	Clear.	..	..	..	..	....
18	..	..	..	..	....	53	59	.15	Ditto.	Ditto.	55	67	.12	..	Clear.
19	..	..	..	..	....	54	59	.08	..	Ditto.	..	..	..	..	....
20	50	53	29.96	S. W. lt.	Hazy.	..	..	..	..	....	56	65	.12	S. W. lt.	Clear.
21	50	53	30.02	Ditto.	Ditto.	56	61	.16	..	Clear.	58	66	.15	S. E. lt.	Ditto.
22	53	55	.04	S. E. lt.	Clear.	58	62	.12	..	Ditto.	59	68	.10	Ditto.	Ditto.
23	53	55	.08	W. lt.	Ditto.	57	60	.18	S. lt.	Ditto.	..	..	..	..	....
24	58	59	.08	S. E. lt.	Ditto.	61	68	.14	Ditto.	Ditto.	..	..	..	..	....
25	55	59	.05	S. W. lt.	Cirro-cumuli.	..	..	..	..	....	..	..	..	..	....
26	52	57	.04	S. lt.	Clear.	54	61	.1	S. E. lt.	Clear.	55	66	.12	W. lt.	Clear.
27	..	..	..	..	....	..	..	..	..	....	..	..	..	..	....
28	53	58	.5	S. W.	....	..	63	.3	S. lt.	Clear.	57	68	.4	S. E.	Clear.
29	52	56	.4	S. lt.	Clear.	56	60	.2	W. lt.	Ditto.	56	67	.3	S. W.	Ditto.
30	53	55	.3	S.	....	52	68	.1	S. lt.	Ditto.	55	66	.2	S. lt.	Ditto.
31	54	57	.5	S. lt.	Clear.	55	64	.2	W. lt.	Ditto.	56	65	.1	Ditto.	Ditto.
Total.	1478	1566	288.	..	....	1249	1438	299	..	....	1169	1349	.262	..	....
Averg.	54.714	58.000	30.107	..	....	56.773	62.522	30.130	..	....	58.450	67.450	30.131	..	....

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